DOCUMENT RESUME

ED 382 862 CE 069 019

TITLE	Education's Impact on Economic Competitiveness. Hearing on Examining Education's Impact on Economic Competitiveness before the Subcommittee on Education, Arts and Humanities of the Committee on Labor and Human Resources. United States Senate, One Hundred Fourth Congress, First Session.
INSTITUTION	Congress of the U.S., Washington, D.C. Senate Committee on Labor and Human Resources.
REPORT NO	ISBN-0-16-047120-6; Senate-Hrg-104-23
PUB DATE	2 Feb 95
NOTE	121p.; Small type may not reproduce well.
AVAILABLE FROM	U.S. Government Printing Office, Superintendent of Documents, Congressional Sales Office, Washington, DC 20402.
PUB TYPE	Legal/Legislative/Regulatory Materials (090)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Economic Development; *Economic Impact; *Education Work Relationship; Federal Aid; Financial Support; Hearings; *Outcomes of Education; Policy Formation; Position Papers; Postsecondary Education; Public Policy; *Role of Education; Salary Wage Differentials; *School Business Relationship; Secondary Education; Taxes; *Vocational Education
IDENTIFIERS	Congress 104th; *Economic Competitiveness

ABSTRACT

This document contains the text of testimony presented at a congressional hearing examining education's role in economic competitiveness. Senator James M. Jefford's opening statement is followed by testimony given by representatives of the following agencies and organizations: TRW, Inc., Circuit City Stores, Inc., McGraw-Hill, Inc., Drew University, U.S. Bureau of the Census, University of Southern California, Cornell University, and Knowledge Network for All Americans. Also included is a paper titled "Improving Education: How Large Are the Benefits? How Can It Be Done Efficiently?" (Bishop), and a paper titled "Improving National Economic Competitiveness through Educational Investment" (Lloyd). Charts summarizing the following are contained in the testimony: average annual federal taxes by family for 1991; change in median family income by education; education loan debt; employment by major economic sector from 1800 to 1993; the growing gap between individuals based on mastery of the skills required for economic competitiveness; distribution of available capital stocks in the U.S. business economy; components fueling domestic economic growth in the United States from 1929 to 1990; and shifts in federal budget priorities from 1993 to 1995. (MN)

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EDUCATION'S IMPACT ON ECONOMIC COMPETITIVENESS

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HEARING

BEFORE THE

SUBCOMMITTEE ON
EDUCATION, ARTS AND HUMANITIES

OF THE

COMMITTEE ON
LABOR AND HUMAN RESOURCES
UNITED STATES SENATE

ONE HUNDRED FOURTH CONGRESS

FIRST SESSION

ON

EXAMINING EDUCATION'S IMPACT ON ECONOMIC COMPETITIVENESS

FEBRUARY 2, 1995

Printed for the use of the Committee on Labor and Human Resources

U.S. GOVERNMENT PRINTING OFFICE
88-005 CC WASHINGTON : 1995

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402
ISBN 0-16-047120-6

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CONTENTS

STATEMENTS

THURSDAY, FEBRUARY 2, 1995

Page

Jeffords, Hon. James M., a Senator from the State of Vermont, opening statement 1
Gorman, Joseph T., chairman and chief executive officer, TRW, Inc., Cleveland, OH; and Alan L. Wurtzel, vice chairman and former chief executive officer, Circuit City Stores, Inc., Washington, DC 5
  Prepared statements of:
    Mr. Gorman 8
    Mr. Wurtzel 14
Dodd, Hon. Christopher J., a U.S. Senator from the State of Connecticut, prepared statement 23
Dionne, Joseph L., chairman and chief executive officer, McGraw-Hill, Inc., New York, NY; and Hon. Thomas H. Kean, president, Drew University, Madison, NJ 26
  Prepared statements of:
    Mr. Dionne 29
    Mr. Kean 37
Pell, Hon. Claiborne, a U.S. Senator from the State of Rhode Island, opening statement 39
Kominski, Robert, Assistant Chief for Social and Demographic Statistics, U.S. Bureau of the Census, Washington, DC; Morton Owen Schapiro, dean, College of Letters, Arts and Sciences, University of Southern California, Los Angeles, CA; John H. Bishop, associate professor, Cornell University, Ithaca, NY; and Kent Lloyd, chairman and chief executive officer, Knowledge Network for All Americans, Arlington, VA 47
  Prepared statements of:
    Mr. Kominski 49
    Joint statement of Mr. McPherson and Mr. Schapiro 51
    Mr. Bishop 57
    Mr. Lloyd 93

ADDITIONAL MATERIAL

Charts:

Average annual Federal taxes by family, 1991 2
Change in median family income by education 3
Education loan* debt 3
Employment by major economic sector: 1800 to 1993 88
An American catastrophe: the growing gap 89
Distribution of available capital stocks: U.S. domestic business economy 90
Components fueling U.S. domestic economic growth, 1929 to 1990 91
Shifts in Federal budget priorities: 1993 to 1995 92

EDUCATION'S IMPACT ON ECONOMIC COMPETITIVENESS

THURSDAY, FEBRUARY 2, 1995

U.S. SENATE,
SUBCOMMITTEE ON EDUCATION, ARTS AND HUMANITIES, OF
THE COMMITTEE ON LABOR AND HUMAN RESOURCES,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m., in room SD–430, Dirksen Senate Office Building, Senator James F. Jeffords (chairman of the subcommittee) presiding.

Present: Senators Jeffords, DeWine, Gorton, Pell, and Kennedy.

OPENING STATEMENT OF SENATOR JEFFORDS

Senator JEFFORDS. The Senate Subcommittee on Education, Arts and Humanities will come to order.

Good morning. I would like to welcome everyone to the first meeting of the U.S. Senate Subcommittee on Education, Arts and Humanities in this, our 104th Congress.

I am very excited to serve as Chairman. I have waited 20 years for this moment, and after having been a ranking member of subcommittees and committees for some 20 years, I finally have an opportunity to hold a hearing myself, and I am deeply honored to serve in this capacity.

It is no surprise that I plan to conduct the subcommittee's business in the same bipartisan spirit that marked the tenure of Senator Pell, who will be here a little later, and my predecessor Senator Stafford. Senator Pell has been a driving force in this subcommittee, and we are indebted to him for his years of very hard work.

This hearing will kick off a series of hearings that I intend to hold throughout the year to discuss the importance of education to the overall success of our citizens and the Nation.

Education has always been one of my top priorities, but I think it must be everyone's priority if we are to maintain the United States as the world's foremost economic power.

My intention for this hearing is to highlight the relationship between education and the country's current and future economic and global competitiveness. This issue is a high priority for me because education is fundamental to increasing the supply of highly skilled workers for a country intent on competing aggressively in an increasingly competitive global economy.

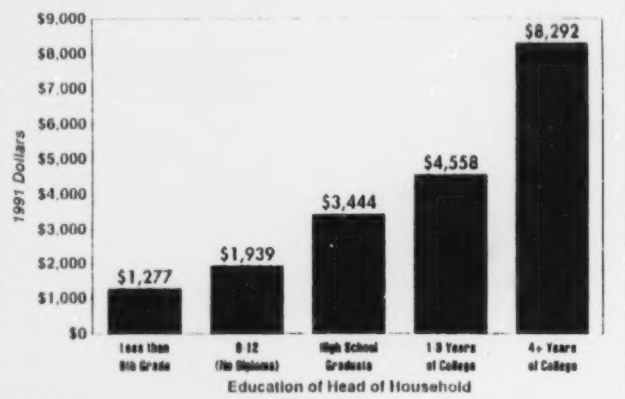
Americans understand intuitively that investing in education is the key to our future success and the best possible national investment that we can make in our country. The evidence is clear. Countries which spend more on education per pupil enjoy higher per capita levels of income.

Economists such as Eric Hanushak, who testified before this subcommittee in the last Congress, estimated the return to investment in college education at over 30 percent in the 1980's. And some institutions, such as Motorola University, report corporate savings of $30 to $35 per hour with respect to investment in training. That is a 3,000 to 3,500 percent rate of return.

Here is a chart which explains why education is so critical for the future success of our country. It shows that college graduates pay at least twice as much as everyone else in Federal taxes each year. And the same can be true of highly skilled workers. Thus, the more skilled we become, the more people who can earn the kind of income that we want to see earned, the better able we are as a nation to take care of our resource needs. This chart suggests that a more highly educated work force is key if we are going to balance the budget without raising taxes. It is a crucial factor for increasing the level of Federal resource.

[The chart referred to follows:]

Average Annual Federal Taxes by Family, 1991

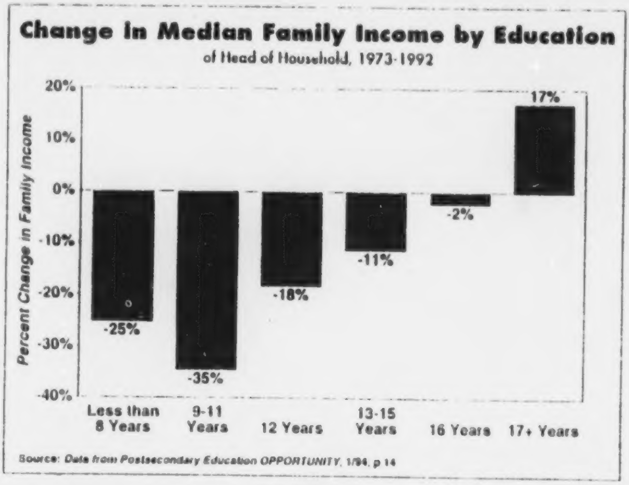


Source. Data from *Postsecondary Education OPPORTUNITY*, 10/94, pp 1&3

Senator JEFFORDS. People as rational consumers also realize that investing in their own education leads to substantially higher lifetime earnings. As we shall hear later this morning, a person with a bachelor's degree earns over 1.5 times the income of a person with only a high school degree. A professional degree brings over 350 percent higher lifetime earnings than a high school diploma in itself.

This second chart also indicates what has happened to family incomes in recent years. It demonstrates very clearly that we as a nation need to work very hard to improve the economic level and capacity of our individuals if we are going to succeed as a nation. This chart, for example, shows that over the past 20 years, only college graduates have increased their real earning potential, while everyone else lost ground. College graduates have earned 17 percent more in real wages, while the earnings of high school dropouts fell by 35 percent.

[The chart referred to follows:]



Change in Median Family Income by Education

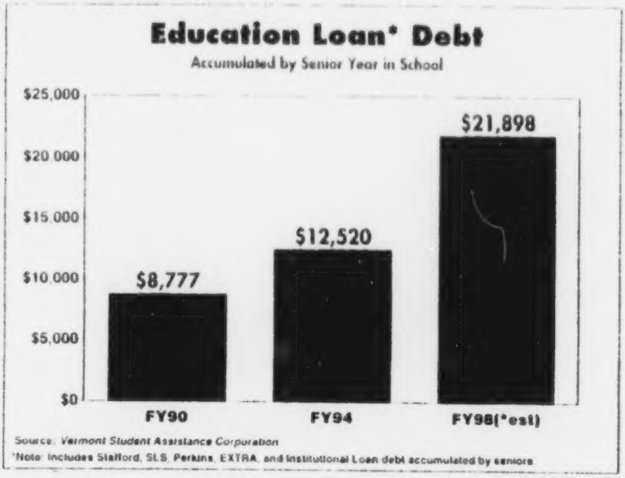
of Head of Household, 1973-1992

Source: *Data from Postsecondary Education OPPORTUNITY, 1/94, p 14*

Senator JEFFORDS. Thus, it is clear that education is an important investment for personal as well as national competitiveness. But looking even at my own State, the rate of loan debt has increased dramatically over the course of the last decade, making it more and more difficult for students to go to college.

In this third chart, you can see that just in the last few years, we have almost doubled the amount of money that a student will have in debt after leaving college.

[The chart referred to follows:]



Education Loan* Debt

Accumulated by Senior Year in School

Source: *Vermont Student Assistance Corporation*

*Note: Includes Stafford, SLS, Perkins, EXTRA, and Institutional Loan debt accumulated by seniors

Senator **JEFFORDS**. Those figures are critically important. In an age of expanding global competition and a compressed product cycle, other countries are inching their way into high-tech fields which we once dominated. Almost half of students graduating with engineering doctorates from U.S. universities are temporary residents from other countries. That is a change from the past, when we used to receive a number of foreign students, but they all remained here, and our corporations benefited from their skills. Now they are all going home.

This is a tremendous compliment to the quality of our universities and institutions granting postgraduate degrees, and I think it is positive for students from around the world to be exposed to our society and democracy, but from a purely economic standpoint, we are educating our economic competitors.

Many of my colleagues, while acknowledging the importance of educational investments, argue that throwing money at education is not the solution. I agree.

Increasing educational expenditures in themselves will not solve our country's educational deficiencies. We have a responsibility to invest education dollars wisely, and that includes more active congressional oversight over Federal education initiatives. Simultaneously, we must also reinvigorate our schools by demanding that students learn to high academic standards. Why? Because the status quo in our schools has failed. Too many of our graduates finish school without knowing the 3 Rs, much less more rigorous content standards.

For our country to remain competitive, it is essential that our schools prepare our future work force for the demands of the 21st century. Unfortunately, until we present our students with challenging content standards, that goal will not be realized. This is particularly true for our non college-bound students. While we have emphasized the importance of college education, we cannot overlook the significance and the magnitude of the problem.

One of the most staggering statistics is that one-third to one-half of our high school graduates are functionally illiterate when they graduate. That is to say, they cannot fill out an entry-level job application, to say nothing of handling complex on-the-job instructions. Later this year, we will hold hearings on the Perkins Vocational Education Act to address some of these very fundamental questions.

These are my beliefs as a legislator, based upon countless conversations with constituents and business leaders over the years, and my experience as a member of the education committee in both the House and the Senate. But with the fiscal pressures we face, mere beliefs may not be sufficient to maintain Federal support, and all of our assumptions need to be tested.

Today, we are fortunate to hear testimony from experts in the fields of education and economics, both from the business and research communities.

When Senator Pell arrives, we will interrupt for his opening statement.

Now, I would like to introduce the first panel, but before I do that, I would ask my good friend Senator DeWine to please introduce Mr. Gorman.

Senator DEWINE. Thank you, Mr. Chairman, Senator Kennedy. It is my pleasure, as one of the two Senators from Ohio, to introduce today a man who has fought for U.S. competitiveness for many, many years. Joseph T. Gorman has been chairman and chief executive officer of TRW, Incorporated since 1988. He has served as president and chief operating officer of TRW since 1985.

As someone who, as I know from my own experience in the State of Ohio, is concerned very, very deeply about American competitiveness, we are looking forward to your testimony, Mr. Gorman.

Senator JEFFORDS. Our second witness in the first panel is Alan Wurtzel, who is vice chairman of the board and former chief executive officer of Circuit City. He is also chair of the National Alliance of the Business Council on Excellence in Education. Welcome to you, too.

We will have you both testify first, before we ask questions, and then the members of the committee will have an opportunity to question you at that time.

First, Mr. Gorman.

STATEMENTS OF JOSEPH T. GORMAN, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, TRW, INCORPORATED, CLEVELAND, OH; AND ALAN L. WURTZEL, VICE CHAIRMAN AND FORMER CHIEF EXECUTIVE OFFICER, CIRCUIT CITY STORES, INCORPORATED, WASHINGTON, DC

Mr. GORMAN. Thank you very much, Mr. Chairman and subcommittee members. I am most pleased to have this opportunity today to speak to you to address the very complex and interrelated problems of how education in fact, at all levels, impacts our Nation's international competitiveness.

To set the stage for my remarks, I am going to show you a 60-second public service spot sponsored by the Education Excellence Partnership and the United States Department of Education. The Partnership is a unique coalition of four major national organizations: the Business Roundtable, the National Governors' Association, the American Federation of Teachers, and the National Alliance of Business.

Could we roll the video, please? [VIDEOTAPE SHOWN]

About 1,000 people call the 800 number just shown each week in response to this ad. They receive a booklet entitled, "Moving America to the Head of the Class: 50 Simple Things You Can Do."

The Partnership developed this ad as part of a public awareness campaign called "Keep the Promise," and we want indeed every citizen to understand the urgency of the problem and feel motivated to act.

I know that you have my written statement, and I know that it will be entered into the record of these hearings, so I will briefly summarize some key points, if I may.

I would like to start by saying that I believe that our Nation as a whole is seriously off-track. And by the way, that has been reflected, of course, in the election of the President and in the election of this Congress. That is indeed what people feel. A poll recently showed that 80 percent of our people feel that we as a nation are seriously off-track. Never before in the history of the poll had that number been above 60 percent.

And we are off-track because despite all of our strengths, our successes, and even our triumphs, we are facing extraordinarily serious social and economic problems. They are interdependent, and we must move on both fronts with equal vigor and commitment, or they will surely tear us apart.

And as I mentioned, the American people increasingly recognize this, not in the sense of a highly sophisticated intellectual notion about all that must be done, but rather in a common sense, gut feel notion that a lot is terribly wrong.

The problems facing us socially are not new—poverty, crime, unskilled workers, illiteracy, racial tensions, violence. The list could go on, and you know all about them as well as I do.

On the economic side, budget deficits, trade deficits, competitiveness in global markets, low productivity gains, crumbling infrastructure—and again, the list could go on and on.

We in the aggregate are facing a crisis, and if it is not indeed a real crisis, it will do until a real one comes along. It is time to act, and we have to act in interrelated ways if we are going to remain competitive in this rapidly changing world.

At the root of all of this—a root cause, at least—is our system of education, particularly K through 12, which has been undergoing a dry rot for some period of time. We must overhaul it and overhaul it dramatically if we are to remain competitive.

Mr. Chairman, you mentioned a number of statistics, and I could offer many more. A recent Department of Education survey showed that about 47 percent of our total adult population is to some significant degree functionally impaired. That is an incredible statistic. In 1851, we had a literacy rate of 80 percent. We today at best have a basic literacy rate of 80 percent. We led the world in those days, where there were rates of 50 percent in Western Europe, 30 percent in Southern and Eastern Europe, and every Nation in the world was well behind us. Today they have all passed us and passed us in dramatic fashion. Literacy rates now around the globe are 99 percent in the former Soviet Union; 99 percent in Western Europe, basically; 99 percent in Japan; 98 percent in Korea. We fall in more or less with China and Mexico, where they have literacy rates of 75 to 80 percent.

Eighty-eight percent of our kids cannot consistently place fractions in order of size. Eighty percent of our 18-year-olds cannot write an intelligent, grammatically sound essay. Eighty percent cannot infer critical meaning from a serious newspaper article.

We lag the world. We come in dead last among 17 industrial nations in math and science on average for our 18-year-olds. You ask what about the top 10 percent. They come in dead last also when compared with the top 10 percent of the other 16 industrialized nations. By the way, we fall in behind Hungary, which is 16th.

So we have a serious, serious competitive issue that we are facing. In our company, we have to teach remedial arithmetic at the 3rd, 4th, 5th grade level to 18-year-old high school graduates—not dropouts, but graduates—from the inner city of Cleveland. We are facing a crisis. We must do something about it.

What are we doing? Again, it is set forth in some detail in the written testimony, but let me tell you just a little bit about what we are doing in the Business Roundtable effort.

Beginning in 1989, at the Charlottesville Summit, we joined hands, that is, the National Business Roundtable, with the Governors' Association and with President Bush, to make a 10-year commitment to transformationally reform our systems of education. In the Business Roundtable, we knew that we had to do that principally through the States, and that an effort would be required in each and every State to bring about systemic transformational reform.

So we put together a program designed to cause there to be chief executive office Roundtable members from each of the States heading task forces in each State, which would put together a coalition in that State, moving forward, a broad segment of society represented, to move toward systemic reform.

I am happy to say that a recent objective study by the RAND Corporation of our efforts shows that there are now 32 States where Business Roundtable leaders are leading or helping to lead a coalition aimed at bringing about this systemic reform. We are making a difference—not enough, not fast enough, of course. But five or six States have already passed comprehensive, systemic reform legislation. There are a number of additional States with bills pending. We need to find ways to bring them home, to get them across the finish line.

We are working hard to do that, particularly in our most populous States, but again the task is agonizingly difficult; there is opposition, and we are facing it increasingly. We are seeing even opposition—politically charged, I think—centering around the Goals 2000 legislation which was enacted and signed last summer, as you know.

What are the nine essential components of a successful education system? Our blueprint is as follows, and I will quickly run through the points.

There are four key assumptions at the outset that we hold. All students can learn at significantly higher levels—all students. We do know how to teach all students successfully because we are teaching some successfully. Curriculum content must reflect high expectations for all students. Of course, instructional time and strategies would vary in success.

Every child must have an advocate, preferably a parent, but if one does not exist or cannot or will not serve as the advocate of that child, it is society's obligation to provide that advocate.

We want a system that is performance or outcomes-based, not input or process-based.

We have to have assessments that are as strong and rich as the skills and areas of knowledge children need to master.

There must be rewards for success and penalties for failure.

We have got to give the staffs in our schools more power if we are going to hold them more responsible.

We have to provide them more development, more training.

We must by definition establish high quality, pre-kindergarten programs, at least and particularly for the disadvantaged.

I think if we are able to enact legislation that brings about those key components, then we will have achieved, Mr. Chairman, the kind of systemic transformational reform that is so critically needed.

With that, I think I will stop and be happy to answer questions at your will.

Senator JEFFORDS. Thank you very much.

[The prepared statement of Mr. Gorman follows:]

PREPARED STATEMENT OF JOSEPH T. GORMAN

I'm Joseph T. Gorman, Chairman and Chief Executive Officer of TRW Inc. and Chairman of the Business Roundtable Education Task Force. I would like to thank Senator Jeffords for his invitation to address the Senate Labor and Human Resources Subcommittee on Education on the subject of education's impact on economic competitiveness.

To set the stage for my remarks, I am going to show you a 60 second public service spot sponsored by the Education Excellence Partnership and the United States Department of Education. The Partnership is a unique coalition of four major national organizations—The Business Roundtable, the National Governors Association, the American Federation of Teachers, and the National Alliance of Business.

(Video to be shown)

About 1000 people call the 800 number each week in response to the ad. They receive a booklet, "Moving America to the Head of the Class: 50 Simple Things You Can Do." The Partnership developed this ad as part of a public awareness campaign called "Keep the Promise." We want every citizen to understand the urgency of the problem and feel motivated to act.

Today I will speak about the extensive and tragic erosion of America's economic and social systems. Despite our strengths, successes and even triumphs, we face extraordinary problems. To solve them, we need to rally around a national agenda that addresses all of our most critical issues in an integrated way, and puts the balanced best interest of all above the special interests that have for too long driven our governments.

We all know too well the list of major problems: poverty, crime, illiteracy, racial tensions, violence and unemployment to name a few. We even know many of the key ingredients for solutions. The challenge for us is in developing and defining the details, getting it done, and moving it all—from rhetoric to reality.

The United States is in grave danger of losing both its greatness and goodness. In fact, we are careening down a path that, if not altered soon and dramatically, will condemn us to mediocrity. Economically, we face massive budget and trade deficits, noncompetitiveness in global markets, low productivity gains, crumbling infrastructure and other serious problems which, if we don't address soon, will have dire consequences on our Nation's health.

We can change the course of our direction. However, we as a nation can only do this by making fundamental changes in the way we try to solve our problems. The American public has signaled their recognition that a lot is terribly wrong. The November elections evidenced the high level of frustration by the public with government decision making at the State, and especially, the Federal levels. The voting public sent a strong message for radical, not minor, change. As proposals emerge and the debate ensues, it behooves all of us to become proactively involved in the process, to put aside political partisanship and to help create and bring about the changes we so urgently need.

To make change, we need to assess where we are now, where we want to be and how we will get there. In essence, we need to do some good, sound strategic planning that will lead to the development of a national agenda that is comprehensible, clear, credible and affordable. Unfortunately, for the past twenty years, we have allowed partisan politics and special interests to drive our policies in a piecemeal, ad hoc fashion. What we need are policies with clear goals and action plans that support a new social and economic national agenda.

I've already made reference to where we are now. One need not look further than the front page of the morning newspaper to see the breadth and depth of our plight nationally and internationally. Just as America's social and economic problems are interconnected, so too are these kinds of problems connected Nation to Nation. We cannot forget interconnectivity or interdependence, nor should we try. Our new national agenda must reflect a recognition that every change we make socially and economically will affect our global dealings and relationships.

Having taken this quick sobering snapshot of where we are, let's look at where we want to be. I would like to suggest the following three strategic objectives:

—Superior economic performance that is sustainable to generate enough good jobs and to raise standards of living necessary for social harmony.

—Superior social systems that are sustainable and, together with good economic growth, generate opportunity for all but offer a safety net for the truly needy.

—Strong world leadership that promotes international cooperation in problem-solving.

There is no mystery as to what must be done to meet these objectives. Our national goal should be to eliminate the deficit and begin to generate modest surpluses, including social security, within 10 years. Other solutions include reforming the tax systems to encourage savings and investment, overhauling in radical ways our system of entitlements, reforming our tort system and reducing our escalating trade deficits.

There are other steps that need to be taken to address our pervasive social problems. We should start with improving the Nation's systems of public education. Much of America's success can been traced to our educational systems. However, we are experiencing an educational "dry rot" that is only partially visible and is spreading. A few sobering statistics supports this thesis. One in five American adults is functionally illiterate, and those ranks are growing. On average, our students ranked fourteenth—behind Slovenia and Spain that are ranked twelfth and thirteenth—on an international math test. We are almost at the bottom in on most other international assessments.

There are many compelling reasons for placing major improvements in education high on our priority list:

—Social justice/equal opportunity;
—alleviation of poverty and human misery;
—reductions in crime and welfare costs;
—ability to compete in a global economy;
—preservation and enhancement of our quality of life.

Improving education is already at the top of my list. I am firmly convinced that we must change from an input, process-oriented system to one measured by results, based on what our students actually know and are actually able to do, as a result of their time in school. I also believe that school systems and children must be held accountable for the quality of the results.

It is for this reason that I have been so heavily involved in the Business Roundtable's 10-year commitment to forge alliances with governors, State legislators, State school officials and many other stakeholders, to make state-level changes in education policy to cause fundamental school improvement and reform. The Business Roundtable is committed to the following nine Essential Components of a Successful Education System:

1. A successful education system operates on four assumptions:

—Every student can learn at significantly higher levels;
—Every student can be taught successfully;
—High expectations for every student are reflected in curriculum content, though instructional strategies may vary; and
—Every student and every preschool child needs an advocate preferably a parent.

2. A successful system is performance or outcome based.

3. A successful system uses assessment strategies as strong and rich as the outcomes.

4.A successful system rewards schools for success, helps schools in trouble, and penalizes schools for persistent or dramatic failure.

5.A successful system gives school-based staff a major role in instructional decisions.

6.A successful system emphasizes staff development.

7.A successful system provides high-quality prekindergarten programs, at least for every disadvantaged child.

8.A successful system provides health and other social services sufficient to reduce significant barriers to learning.

9.A successful system uses technology to raise student and teacher productivity and expand access to learning.

This nine-point agenda provides the structural framework for reaching the six National Education Goals that were set by President Bush and the Nation's Governors in 1990.

Achieving changes that embody these nine essential components requires broad and sustained support from all segments of society—parents, teachers, principals, elected officials, business leaders and the students themselves. In many communities, local businesses have become full partners in unprecedented joint ventures to improve systems of education along its entire length. For example, since 1993, TRW Inc. has contributed $250,000 to early childhood projects. In 1995, we will be investing over $325,000 in two major initiatives to help both preschool children and their care givers become better prepared with the required life skills necessary to compete in school and society. We are among many major U.S. corporations throughout the United States who are making similar commitments to improve systems of education as a means to enhance economic competitiveness.

I have been pleased and encouraged by the priority placed on education reform during the Bush Administration, and last year, with the Clinton Administration and the 103rd Congress, that worked to enact the "Goals 2000: Educate America Act." I was one of several business leaders who worked very hard on this legislation because of the support it gives states to make systemic improvements to their education systems without the heavy hand of the Federal Government dictating how they should make reform happen.

Additionally, the Goals 2000 legislation complements The Business Roundtable's strategy to improve the Nation's elementary and secondary schools. It encourages states, on a voluntary basis, to set demanding academic standards for all students. One of the main problems with American education is that, unlike our international economic competitors, we have no agreement about what students need to know when they graduate from school. We tell students how many years they need to attend school and how many courses they need to take, but we do not have clear expectations about what they should know and be able to do. The result, as illustrated so vividly in the ad you saw earlier, is that American students are not performing as well as those in other nations.

The states are responding with a variety of exciting educational initiatives. Vermont has a comprehensive reform plan called "A Green Mountain Challenge: Very High Skills for Every Student; No Exceptions, No Excuses."In the State of Ohio, there is evidence that setting higher standards and focusing the system on results makes a difference in student achievement. Ohio has seen rising test scores on Ninth-Grade Proficiency Tests as well as ACT and SAT scores.

Kentucky, a State that is implementing a bold education improvement strategy that includes much higher standards for student performance, has seen test scores improve dramatically. Kentucky's 1995 plan includes an allocation of $36 million for bonuses to schools and teachers whose students raise their test scores.

South Carolina, Oregon, Missouri, Washington and Michigan are among thirty states that have standards-setting efforts underway, efforts that should clarify what students should learn, improve testing and consequently change the way our Nation's 40 million public school students are prepared to come into our workforce. However, elected officials, business groups, corporate leaders, teachers and parents must continue to advocate educational strategies that center on raising academic standards.

TRW Inc. and the Fortune 500 companies that are members of The Business Roundtable are firmly committed to making fundamental, comprehensive changes to our Nation's public school systems. The past efforts that merely tinkered around the edges did not work; we have no choice but to insist that change occur. The stakes are too high not to do so. Unless we take control of our economic and social plights at home, we are unlikely to have either the resources or the moral authority to lead. The United States cannot afford not to lead. The risks to our own self interest, and to the rest of the world, are too great.

I would like to encourage this subcommittee, and all committees with jurisdiction over educational issues, to continue supporting the work that has already been accomplished here in Washington on behalf of State and local school reform. Now is not the time to back away from what is truly a bi-partisan commitment to our Nation's children, a commitment that The Business Roundtable continues to firmly stand behind.

We must all recognize that the changes we are attempting to make will take time. We must resist the temptation to pull-back in favor of politically-appealing quick fixes. Such retreats will do little more than redirect our attention and keep moving us and our children further behind.

Senator JEFFORDS. Mr. Wurtzel?

Mr. WURTZEL. Chairman Jeffords and distinguished Senators, thank you for the opportunity to testify on the link between education and economic competitiveness. As Senator Jeffords indicated, I am Alan Wurtzel, and I am currently vice chairman of Circuit City Stores; from 1972 to 1986, I served as CEO. Circuit City is today a company approaching $7 billion in sales.

Since stepping down as CEO of Circuit City, I have devoted approximately half my time to improving education of this country. I have served on two national panels; I am very proud and honored to do so. The first produced the landmark report "America's Choice: High Skills or Low Wages?" and the other was a subcommittee of the congressionally created Competitiveness Policy Council that Albert Shanker chaired.

On a continuing basis, I serve as a member of the Virginia State Board of Education, so I am involved in education policy on a day-to-day basis with the State of Virginia. I am a trustee of Oberlin College in Senator DeWine's home State and a member of the executive committee of the National Alliance of Business. The National Alliance, or NAB, is an organization of 3,500 members from very large—including companies like MCI, Bell South and Motorola—to very small. Its historic focus is on work force education, training and economic opportunity, and I am here today to testify on behalf of NAB and myself.

Most businesses recognize that they can no longer compete in this world based simply on the advantages of location, investment, or natural resources. The age of information and rapid transportation has created a global economy that has changed the nature of work and the workplace for good. These changes demand a new kind of worker, a knowledge worker, with a new set of skills.

The skill deficits of our Nation's workers are all too apparent. You and Mr. Gorman have provided quotes and statistics, and there are other ways to measure it, which I will not take the time to detail. I think the case is clearly and well-made that our Nation's skill levels, particularly for the front-line workers, are well behind those of our global competitors.

This shows up at Circuit City in ways that I would like to describe more specifically. At Circuit City, we screen 15 to 20 candidates for every job vacancy. Typically, applicants for entry-level jobs lack minimal capability of reading, writing, computing and communicating. They often lag basic generic work force skills such as critical thinking, efficient resource allocation, and interpersonal relations.

Like many employers, Circuit City has eliminated or sharply reduced most of its low skill jobs. That exacerbates the problem. Our warehouses, for example, utilizing State of the art technology, have two or three times their former throughput. We have put through two or three many times as many goods in the same warehouse with half as many employees through the use of State of the art technology.

Our advertising department produces three times as many print ads with the same work force by composing ads on a computer rather than artists used to lay them out by hand.

Our stores no longer have cashiers. Sales counselors complete the transaction by taking cash, checks, credit cards, or credit applications, so that there is a "one-stop" between the time the customer enters the store and the time they leave, reducing or eliminating the relatively low-skilled cashier jobs.

Those jobs that remain are focused on customer satisfaction, all of which require good communications, critical thinking, and interpersonal skills.

This type of reengineering is occurring throughout American business. The low skill jobs are gone or are far fewer in number. The jobs that remain require far higher levels of ability to read, to write, to communicate, to master new knowledge, to learn new skills, ask questions, and solve problems. Yet our schools for the most part continue to operate based on old assumptions and outmoded policies.

Workers on a 1920's production line or a family farmer did not need many skills beyond basic 6th or 8th grade math and English. Consequently, for the non college-bound kids, we have a dumbed down system with low expectations and a culture of accepting little effort or results to move students through the process.

For the academically talented or economically advantaged, our high schools provide an enriched academic program geared to college admissions requirements. And for the first 70 years of this century, this dual system I think worked reasonably well in this country. Our production system at the early part of the century was based on a relatively small number of well-educated managers, engineers and scientists who directed a large number of relatively unskilled workers, and we became the economic wonder of the world using a large mass of relatively untrained people and a small group of highly trained people in a Henry Ford or Tayloristic production system.

But that model of competitiveness is, of course, no longer effective. American business, like Circuit City, is finding that these older paradigms no longer work. To be efficient, we need more and more workers who can think, learn, and solve problems on their own, and fewer and fewer whose principal skill is to show up on time and do what they are told, over and over and over again.

For almost a decade, the leaders of America's leading high tech businesses such as IBM, Xerox, TRW, and others have led the fight for standards-based education reform. The work of the BRT and the nine principles has become the standard, I think, for education reform in this country. And I am pleased to note that I think this message has now moved down from the first-tier companies of this Nation, such as those I have mentioned, to the broader business community, and there is greater and greater consensus among medium-size and small businesses that this kind of systemic education reform is required.

I think the basic problem in the achievement of American kids, that Mr. Gorman and others have quoted, is not that our kids are any less able, but that we have lower expectations, and we are not able to enforce or create higher accomplishment, because if we don't have a high standard against which to measure results, we are unable to hold our kids and our teachers and our school systems to the outcomes or results that we want.

The Competitiveness Policy Council found that the average high school student in 1987 did only 3½ hours of homework each week—3½ hours a week for high school kids. That is squeezed into a busy schedule, they found of 25 hours of television watching and 10 hours of employment.

So we have got our priorities backwards, and I do not think it is only the fault of the schools; it is the fault of our society. Until we set high standards and insist that our kids and our schools get there, we are not going to catch up with our global competitors.

Accountability for students today simply means staying in school long enough to accumulate the credits required to graduate, regardless of what the student knows or is able to do. Accountability for schools or school systems generally means comparing the results with peers—Virginia and Vermont, for example, or Richmond and Roanoke, within the State of Virginia. We compare ourselves to each other on a norm-referenced rather than criteria-referenced test. "Norm-referenced" means that this is the average, and are we above or below the average. This is like Lake Woebegone, where everybody is above average. But none of us are comparing ourselves to an external standard and objective criteria of what kids need to know and be able to do to be good workers and for our country to compete in the global economy.

I believe there is a role for the Federal Government to encourage States and localities to develop measures of accountability based on objective criteria and not comparative expectations. Once they have objective standards, then they can begin, the States and localities, to create meaningful incentives for teachers, students and school systems to perform at or above expectations and also create negative consequences for those who do not. Without such incentives and consequences, we cannot expect to catch up much less exceed the performance of our global competitors.

This is one reason why so many of us in the business community supported the Goals 2000: Educate America Act, passed in the last session. I realize that in the course of its passage through Congress, a number of changes were made to the Goals bill that detracted from the original purpose. These problems can be remedied. NAB believes it is essential. But NAB believes that we should not throw the baby out with the bath water, that it is essential to retain a national as distinct from a Federal entity, and a process—a Federal entity and a Federal process to set education standards that States can use as a benchmark, on a voluntary basis, not to be imposed, but as a benchmark for States to copy to the extent that they want to, to reconstruct their school systems and set high standards for all kids.

I believe most Governors want this, most business leaders want this, and the country needs this.

In my capacity as chair of the National Alliance of Business' Council on Excellence in Education, I have been chairing a sub task force on education standards. The task force, comprised of over 34 companies, is designed to inform standard-setters at both State and national levels about what business expects from newly minted or newly graduated entry-level workers.

Last week, we released our initial recommendations to the National Education Goals Panel. I have copies here, and I believe copies are available for your staff and for the committee to review.

Mr. WURTZEL. There were nine basic principles to guide the development of standards. Business is clearly interested in high academic standards, and I think in that respect there is little or no difference between our goals and those, let us say, of the college or university community. And we certainly share the basic nine principles of the BRT.

But in addition to that, we believe first of all that there must be one set of standards for all kids; that the standards must include a common core of skills such as the SCANS skills, which I am sure you are familiar with; skills about being able to do critical thinking, to allocate resources, whether it is time or money, efficiently; interpersonal skills, teamwork, things of that nature which are more important in the workplace than they are for college or university work as such.

These standards must reflect real world requirements, they must be voluntary, they must be dynamic and change as the world is changing. Our standards need to change.

There is no reason to believe that American students cannot master the same difficult material in core academic subjects that is routinely expected of students in our competitor countries. On the contrary, Americans have always risen to the challenge once they understand it clearly.

The question before us needs to be: Where on the face of the globe are educators and students together doing the best job of preparing a future work force for the 21st century? American firms must meet world class competition to survive and prosper, and the business community believes that no less should be expected of American teachers, parents, and students.

Thank you.

[The prepared statement of Mr. Wurtzel follows:]

Prepared Statement of Alan L. Wurtzel

Thank you for the opportunity to testify on Education's Impact on Economic Competitiveness. My name is Alan Wurtzel. I am currently Vice Chairman of Circuit City Stores, Inc. From 1972 to 1986 I served as CEO of Circuit City. During those years Circuit City grew from $55 million in sales to $1 billion. This year, sales will exceed $7 billion.

Since stepping down as CEO of Circuit City, I have devoted approximately half my time to improving education in this country. I have served as a member of two national commissions on education. The first is the bipartisan commission that produced the landmark report: America' s Choice: high skills or low wages!

I also served as a member of the Education Subcouncil of the congressionally created Competitiveness Policy Council chaired by Albert Shanker.

On a continuing basis I serve as a member of the Virginia Board of Education, as a Trustee of Oberlin College, and a member of the Executive Committee of the National Alliance of Business. NAB is an organization of 3,500 members, from very large (MCI, Bell South, Motorola) to very small. Its historic focus is on work force education, training and economic opportunity.

I am testifying today on behalf of NAB and myself. Most businesses recognize that they can no longer compete in this global economy based on advantages of location, investment or natural resources. The emerging age of information and rapid transportation has changed the nature of work and the workplace for good. These changes demand a new kind of worker, a knowledgeable worker, with a new set of skills.

The skill deficits of our Nation's workers are all too apparent to the business community. The Competitiveness Policy Council, to which I referred earlier, found: "Twenty percent of our adults are functionally illiterate, compared with only one percent in Japan. Four in ten business executives say they cannot modernize their equipment because their workers do not have the appropriate skills. Only one in five firms believes that high school graduates can write adequately, while more than two-thirds consider their reading and arithmetic skills substandard."

At Circuit City we screen 15 to 20 candidates for every job vacancy. Typically, applicants for entry level jobs have only minimal capability in reading, writing, communicating and computing. They often lack basic generic work force skills, such as critical thinking, efficient resource allocation and interpersonal relations.

Like many employers, Circuit City has, in fact, eliminated or sharply reduced most of its low skilled jobs. Our warehouses, for example, utilizing State of the art technology have two or three times their former throughput with half as many workers as compared to a few years ago. Our advertising department produces three times as many print ads with the same work force by utilizing computer composition. Our stores no longer have cashiers. Sales counselors complete the transaction by taking cash, checks, credit cards or credit applications. Most of the remaining nonsales personnel are focused on returns, exchanges and customer satisfaction, all of which require good communications, critical thinking and interpersonal skills.

This type of reengineering is occurring throughout American business. The low skill jobs are gone or are far fewer in number. The jobs that remain require far higher levels or ability to read, to write, to communicate, to master new knowledge, to learn new skills, to research information, to ask questions, and to solve problems.

Yet our schools, for the most part, continue to operate based on old assumptions and outmoded policies. Workers on a 1920's production line or a family farmer did not need many skills beyond basic 6th or 8th grade math and English. Consequently, for the noncollege bound we have a dumbed down curriculum, lower expectations and a culture of accepting little effort or results to move students through the process.

For the academically talented or economically advantaged our high schools provide an enriched academic program geared to college admissions requirements. And for the first 70 years of this century this dual system worked. Our production system, based on a relatively small number of well-educated managers, engineers and scientists who directed a large number of relatively unskilled workers, was the economic wonder of the world.

As at Circuit City, American business is finding that these older paradigms are no longer efficient. To be competitive, we need more and more workers who can think, learn and solve problems on their own, and fewer and fewer whose principal skill is to show up on time and do what they are told—over and over again.

For almost a decade the leaders of America's leading high tech businesses such as IBM, Xerox, TRW and others have led the fight for standards-based education reform. This message is now well accepted in the wider business community.

Unlike our international competitors, America has not had high expectations about what our noncollege bound students should know and be able to do. Not having clear expectations has had many disturbing consequences, not the least of which is the inability to hold students, teachers and school systems accountable. No wonder the Competitiveness Policy Council found the average high school student in 1987 did only 3.5 hours of homework each week, squeezed into a busy schedule of 25 hours of television and 10 hours of employment!

Accountability for students today simply means staying in school long enough to accumulate the credits required to graduate, regardless of what they know or are able to do.

Accountability for schools or school systems generally means comparing the results with peers based on a norm-referenced test that has no necessary relationship to the curriculum. To know that Virginia students rank higher or lower than Vermont does not tell us whether either state's students are prepared to compete in the global economy.

We should be encouraging State and localities to develop measures of accountability based on objective criteria, not comparative expectations. Once they have objective standards they can begin to create some meaningful incentives, for students, teachers and school systems who perform at or above expectations, and negative consequences for those who do not. Without such incentives and consequences we cannot expect to catch up, much less exceed the performance of our global competitors.

This is the primary reason that business leaders feel it is absolutely imperative this country develop a voluntary system of academic achievement standards. That is one reason why so many of us in the business community supported the Goals 2000 Educate America Act in the last session of Congress.

I recognize that in its passage through Congress a number of changes were made to the Goals 2000 bill that detracted from its original purpose. These problems can be remedied. NAB believes it is essential to retain a national, as distinct from Federal, entity and process to set educational standards that the states can use as a benchmark, on a voluntary basis, to reconstruct their school systems. Governors want this. Most business leaders want this. The country needs this.

In my capacity as chair of the National Alliance of Business's Council on Excellence in Education I have been leading a task force on education standards. The task force, comprised of over 34 companies, is designed to inform standards setters about what business expects from its workers. Last week we released our initial recommendations to the National Education Goals Panel. Copies are available for you and your staff.

I would like to share with you our recommendations. The Task Force has developed nine principles to guide the development of standards:

1. All students should be given the opportunity to master challenging academic subject-matter calibrated against world-class education standards.
2. There must be one set of standards for all students.
3. Standards must have a common core of skills related to workplace needs.
4. Standards must reflect "real world" requirements.
5. Standards must be voluntary
6. Standards must be dynamic
7. Standards must include criteria against which performance is measured.
8. Business leaders must have a seat at the table to assist in standards setting.
9. Standards and performance measures must be understood and supported by parents and the general public.

This report demonstrates clearly that business is not only supporting the standards development process, but also is committed to seeing standards implemented. There is no reason to believe that American students cannot master the same difficult material in core academic subjects that is routinely expected of students in our competitor countries. On the contrary, Americans have always risen to the challenge once they understand it clearly.

The question before us needs to be: Where on the face of the globe, are educators and students together doing the best job of preparing a fixture work force for the 21st century? American firms must meet world class competition to survive and prosper. The business community believes that no less should be expected of American teachers, parents and students.

Senator JEFFORDS. Thank you very much.

I cannot thank you enough for your testimony. I am frustrated because it is so difficult to make the American public aware of the dire educational situation for their kids and our country, and you have expressed those needs very well, as well as the rewards for high standards.

I would also agree with you that our kids are capable of achieving those standards. Yesterday I was at Jefferson High School with the Secretary of Education, where we had six young men who had competed internationally in a mathematics exam, and they came out first, with perfect scores for each of them. And yet when we compare our students across the board, we are 14th or last.

So, we recognize that we can do it, but we certainly are not doing it. It has been many years since we first faced the "A Nation at Risk" report, which told us that our students were in dire trouble. Since then, at least 30 studies have converged the same message. We have heard testimony like yours that has informed us of that. We are showing ads that inform us of that. But still, as you pointed out, Mr. Wurtzel, we tend to compare ourselves among ourselves, rather than at national levels of excellence, which we need to do.

Where do we stand now? I know that both of you have been working on establishing these standards, and I know there has been considerable controversy about the standards panel and so on. What is your recommendation as to how we can achieve world-wide standards? Are there standards available now in math and science, for instance, that you feel in your own minds are appropriate for our schools, and where do we stand at getting them adopted, and how should we get them in place?

Mr. WURTZEL. I would be glad to start. The good news is that I think the States are moving, or a number of States. Virginia is in the process; the Virginia State Board of Education, on which I serve, is in the process of reviewing a set of much tougher academic standards. But Virginia, like I think every other State, has a problem. We are drawing on the work of the mathematics teachers who have developed what are generally considered excellent standards. Some work has been done in history, as you know, but it is more controversial, and work in science and other core disciplines—arts and music is another area where work has been completed. And these are important, but first of all, these studies were funded by the Federal Government. I do not believe the State of Virginia would have found the $1 million or $1.5 million to convene a 3-year study by the mathematics teachers of this country to develop high national standards in mathematics.

So the Federal Government played a very important role in convening these groups.

There is, however, in my judgment an important missing ingredient, and that is that no one to my knowledge has made a systematic study of what are the standards of other countries. In other words, I think the mathematics teachers have gotten together, for example, and decided what it is that American kids should know, and that is absolutely important; it is essential, and they are far higher than we now require. But they have not been able, because it takes a lot of time and money and funding, to systematically understand what they are teaching in England and in France and in Germany and in Japan and in Korea and make systematic comparisons—and if it is hard in mathematics, it is certainly far harder in language arts and history and social studies and other less definitive subjects than math.

Mr. GORMAN. If I might add, the short answer is that we are not making nearly enough process. There are few States that have adequate standards at all. We are attempting, of course, with Goals 2000 on the books to cause States to focus on standards. We are giving them incentives, if they comply with the requirements in Goals 2000, to develop adequate standards. We are working on it, but I think there is a more important first step, that while we are working on it we ought to be measuring ourselves in terms of improvement. Are the scores improving on existing tests? Do the kids know more today than they knew yesterday? Can more read than could read yesterday? When can they read?

Some school systems are establishing in the first grade a simple goal, a simple standard, that all kids will read by the end of the first grade. So we do not need to spend years and years studying the problem and establishing definitive standards. We need to begin right now to develop certain minimum standards that create improvement year to year, while we are getting to the ultimate goal of having definitive standards.

Senator JEFFORDS. Culture is obviously an important aspect of the problem. As pointed out, children watch 5 hours of television on average at home——

Mr. WURTZEL. That was 25 hours.

Senator JEFFORDS. But 5 hours a day.

Mr. WURTZEL. I am sorry. I beg your pardon.

Senator JEFFORDS. That is a lot.

Mr. GORMAN. Excuse me. Do you know what that adds up to? It is 11,000 on average by the time kids graduate from high school that they have watched television, and that is roughly the number of hours they have spent in the classroom as well.

Senator **JEFFORDS**. Mr. Gorman, earlier today we were talking about other cultures. How does our lifestyle compare with those countries which are our biggest competitors?

Mr. **GORMAN**. Let me give you a few examples along those lines—and I am not suggesting that we must change to be precisely like another culture, because we are different. But let us take Japan, who is a major competitor in many respects. They go to school 240 days a year, their kids do, versus our 180. They spend far more time studying core key subjects than we do. When you add up those hours and days, it turns out that they have gone to school, if you will, 4 years longer by the time they graduate from high school than our kids.

We are in a time warp. We had an agrarian society. Why do you suppose school lets out at 3 o'clock, and why do we take off the summers? So that kids can help on the farm. That made sense 100 years ago, but it makes no sense today.

In Korea, the parents are required to study the same subjects as the kids. And if the kids fail, the parents are called in and asked to take the test. So that there is pressure, and they are educating the parents as well as the kids. And the list goes on.

Three percent of our high school graduates could get into any of the average universities in Europe, given their skill levels by the time they graduate from high school. We, the fact is, are failing miserably on a relative basis.

Senator **JEFFORDS**. I would just comment before I turn to Senator Kennedy that the District of Columbia has decided to meet their budget by cutting back on the school days and by cutting the number of teachers. I do not think I need to ask for any comments on that, and I will leave it at that.

Senator Kennedy.

Senator **KENNEDY**. Thank you very much, Mr. Chairman.

I want to join, I think, all of us on this side of the aisle in commending Senator Jeffords for having these hearings and for his constancy in terms of the priorities and placing value on education. This has been an ongoing and continuing commitment on his part, and we are certainly looking forward to working with him, and with the entire committee and the Congress on these issues, to try to strengthen some of the areas that we have acted on in the past and give new energy to support for education in the future.

I want to commend both of you for being here and for the time that you have spent. The Business Roundtable has been enormously valuable to this committee and to the Senate in the last Congress. You mentioned Goals 2000, and we know you have some concerns, and we want to work with you on those matters in this Congress—on Goals 2000, the extension of the Head Start program, to involve parenting skills in early education interventions.

Mr. Wurtzel, on School-to-Work and America's Choice, we had the first hearings here and the report on America's Choice, and it really set the path for the School-to-Work program. I am sure it is not often that you get called upon to serve on committees or commissions and make recommendations and then have them actually implemented. This was enormously important and really made a very significant difference, and I hope we do not emasculate it in this Congress, but will try to reach out to that 65 to 70 percent of kids who do not go on to higher education—and the list goes on.

We welcome the work that is being done in the Business Roundtable with States to get them moving. There is much that can be done, I think, with the initiative that were provided last year, but as you rightfully point out, those energies and that effort at the local level is just so important.

I was listening to Senator Jeffords remarking that money does not answer all of the problems. All of us would agree with that, and we can find areas—I know I can in my own State—where they are spending too much and not getting what they should be getting. But it is also a reflection of what a country's priorities are. If you are investing in children, investing in them early, investing in the schools and investing in terms of their higher education, that is really a reflection of what a nation is really about. So we want to recognize the importance and the priority that that has.

Also, in terms of your companies and what they have done in contributing to education has been very impressive. So I think it is important that what you say here is based upon a very substantial degree of credibility. The Alliance for Business is working in my own State, in a number of our communities, adopting schools. It is very impressive, and I know you are familiar with it. They have expanded that program, and it has made a really important difference. If you have not visited some of those, it is making a difference in our State.

I hope as we move on through this whole effort in terms of trying to deal with some of the real challenges that we face as a nation in terms of the budget deficit, that we are not going to have a kind of wholesale slashing of education programs, and we hope that you will work with us. Obviously, in terms of selectivity—although we have tried to strengthen the programs which are out there, and I think Senator Jeffords has demonstrated by his opening comments that we want to try to strengthen and improve others so we can make them more meaningful, and I hope you will work with us prior to the time that they are cut to a point where they will not meet the needs of our kids.

Let me just come back to somewhat of a philosophical question, but I think we are talking about some of that as we get into the debate, and that is how you see the Federal role. Clearly, in the postwar period, what was developed in terms of higher education was the combination of individual participation, the Federal Government in terms of Pell grants and Stafford loans, work-study programs; then, increasingly in the 1980's, began to involve the private sector and alliances that are being worked out, as I know in my State, in terms of small businesses and universities, permitting many of the younger, able, gifted and talented people who would otherwise be teaching but because of demographics are unable to do so, to be able to both teach and go into the private sector.

But in the area particularly of K through 12 is the area of greatest crisis. What is your guidance, having thought about this and having had an impact on education policy, what are your benchmarks in terms of the Federal role? What are you going to be telling us, Republican and Democrat alike, about what is appropriate and what is not appropriate? Clearly, it is the standards, but implemented voluntarily; I think we all would agree with that. But what should we be expecting?

We have heard two former heads of the Department of Education talk about killing off that Department, and we have Terence Bell, who comes to a different conclusion. We are going to be tied up a lot in these times, not unlike other times, in symbols, but you two have strong credibility and reality on this, and I would like to ask you what we should be looking for in terms of our role in the area of education, and the earliest interventions with children and as they move on through the education cycle?

Mr. GORMAN. If I may begin, first, we strongly—the Business Roundtable and I personally—supported Goals 2000. We worked very closely with Secretary Reilly and the President himself to garner support for that very important legislation.

There are some things there that, as with all bills, are not perfect and may create some problems here and there; we can clean those up over time.

Beyond that very important point, I would say that philosophically, conceptually, there is a role for the Federal Government to play in education, just as there is a role at the State level for the State to play in local education. And it is a delicate, complex set of questions and issues that surround that. You have constitutional issues at play here; would it be unconstitutional, for example, at the Federal level to set minimum standards for the States? States could have their own standards that were well above those minimum standards, but would it be appropriate to have minimum standards? Perhaps. I leave that to the constitutional lawyers to speak to. But I think at least, at least, we ought to be in a position of encouraging States to establish adequate standards and then meet them.

I think we also at the Federal level have a role to play in creating the kind of social environment in which our kids can learn. Safety is a critical issue. If kids do not feel safe in school, how the heck can we expect them to learn? If they are worried about going to and from home——

Senator KENNEDY. And they are hungry, abused.

Mr. GORMAN [continuing]. And they are hungry, abused. So there, we need to provide the right kinds of incentives, I think, as well, either for the State to take care of some of those issues or direct Federal help.

So I think that there are several roles. I stop short of saying that the Federal Government should step in and take over a State's educational system if it is failing, but in theory one might imagine that capability, ultimately.

I do not agree, in short, with those who say get the Federal Government out of education totally.

Senator KENNEDY. Mr. Wurtzel.

Mr. WURTZEL. I think Mr. Gorman and I share similar views. Education is primarily a State function. I think the national role is leadership, and the focusing of the spotlight of public attention on those areas where as a Nation, by and large, the States are failing to meet what are perceived as important national standards. Early childhood education and Head Start and that sort of thing is an area that all States neglected for many years, or virtually all

States, and the Federal Government has a role to call attention to that and encourage States to meet what is a national need.

The national Government I think sometimes has the ability to look beyond the day-to-day budget crisis that a State department of education or a State legislature has and to come up with resources to begin to focus attention—not mandating, but encouraging.

The setting of high academic standards is another area where, as I said earlier, I think the Federal Government has a role both in convening the best and the brightest minds in this country to set benchmark standards, and in doing the research to benchmark those standards to what in fact is occurring in foreign countries.

So I think the Federal Government has a leadership and encouragement role and to focusing spotlights on areas of problems that States have ignored. I mean, disabled kids were also ignored by States for many years, but the Federal Government has stepped in and provided funds. Now, as a member of the State Board of Education of Virginia, I would be happy to tell you that the Federal Government's heavy hand has gotten far beyond what I think is appropriate, so the Government has to in my judgment put the spotlight on problems and provide some funding and encouragement. But when we go to far in prescribing how everything is done and mandating a lot of things at the State level, that it seems to me steps beyond the role, and that is the delicate balance that I think Mr. Gorman was referring to.

Senator **KENNEDY**. Mr. Chairman, I just have one other area, and that is about your sense within the business community about the importance of this priority. I think all of us know that there are at least 10 politicians out there right now making speeches about the importance of education and children—we do a lot of talking about it, but we do not do as much serious work on it as we should.

Given the demography—most of the bond issues, for example, carried years ago in California never missed, until about 15 years ago—you cannot pass one now—in terms of education. True, Dade County passed an important one, probably the last major one, 6 or 7 years ago. And those are expenditures, obviously, and we know the problems with that.

But given the demography, what is happening out in the communities? You are in touch with the extensions of your companies and corporations and are out talking with the business community. How involved do you think they will be in this next period of time, let us say until the end of the century, in terms of really prioritizing education? Are they really worked up about it? Is this something that is increasingly a matter of concern to them? Are they becoming more engaged in it? What can you tell us just about your own groups, both here and out in the States?

Mr. **GORMAN**. Well, allow me to say that at the Business Roundtable last year's annual meeting, we devoted over half of the time to education, because we believe it is that critically important, in addition to all the other issues we are looking at.

I report at every, single Business Roundtable meeting on the activities of the task forces around the country. We have 25 CEOs who join us on our task force from around the country. We have at least one CEO heading the effort in every, single State of the 200-member Business Roundtable.

Is it universally a passion for all of business? No. Is it increasingly a passion for much of business? Yes. We recognize how critically tied to the quality of life, our very society, but particularly to our international competitiveness. We have got to get at that problem to serve us well down the road.

And I think, yes, in the Business Roundtable context, each of our companies committed 10 years, regardless of who was the chairman of the board—we committed our company to 10 years of commitment. Now, 10 years may not be enough, but it is a good start, and we are 5 years into that now, and making some real progress in a number of key States. We ask regularly the RAND Corporation to review our work from an independent objective standpoint. Their key finding is we are making a significant difference. And where these coalitions are led, they are being led by business in general.

Senator KENNEDY. Mr. Wurtzel, finally, let me ask you—one of the recommendations in America's Choice was about the continuing training programs in corporations, and that there be the skill standards, or both enhanced academic as well as skill standards in schools, and tied into the business communities. And your support for those programs was very important in getting the legislation passed. But one of the recommendations was about the importance of continuing training programs. I guess most of the very best—however you want to define it—but a number of companies and corporations continue those training programs, but of course not nearly at the par of many companies and corporations in other countries, and even at the risk of losing trained personnel to competitors.

Different countries follow different regimes to get continuing training programs. How do you think we can encourage continuing training and continuing education at the corporate level, recognizing that people are going to turn over—we know everyone who enters the job market will eventually have seven or eight different jobs over the course of their careers, many in a company or a corporation perhaps like yours, but anyway, they are going to be moving—they are either going to be moving up or moving out.

Could you just briefly comment about what is happening and what can be done to encourage that?

Mr. WURTZEL. I think Goals 2000 took an important step last year in the creation of the Skill Standards Board, which I am honor to say the President appointed me to serve on the National Skill Standards Board. I think if we can set, on a voluntary basis, standards for various job classifications across an industry—ideally, across a number of industries—that then sends a clear signal to the workers about what they need to know to be a welder or an x-ray technician or an expediter of one kind or another; it sends a clear signal to the education community, whether it is community college or privately-funded or privately-owned education institutions, as to what training is required; it sends a clear message to businesses as to what they need to do with their existing work force to bring them up to voluntary national standards, so that a welder at TRW knows as much as a welder at General Motors. I think that is the first step.

The second step—which is pending, I believe, in this Congress, at least conceptually if not as a bill—is to take the 30 or 40 miscellaneous job training programs that have been added and carbunkled together over the years and eliminate them as independent programs and combine them as a single, flexible, national system for training people who are out of work, regardless of whether it is because of air pollution or coal mine shutdowns or whatever it may be.

Mr. GORMAN. If I could add two points to that, Senator Kennedy, it turns out that business already spends more by far on training than the Federal Government spends on education and training; and indeed, huge amounts are spent. That is point number one.

Second, we are all finding that increased training and pure education, even, matter a lot when it comes to productivity. The more we train, the more we educate and empower our workers, the more highly productive they are. We are finding a clear-cut and direct connection there. So global competition alone will cause American business to train and educate more.

Senator KENNEDY. Well, I believe you, and you are the master, the bottom-line person on that. But I do not know what it takes to get others to look at it quite that way. I mean, you are a leader, both of you are leaders, in this. And the question is how we can get others to do it. Maybe they will just pick it up, but in the meantime, in terms of the national interest, we have some distance to go. But hopefully, your example will lead the way, and we will look for ways of trying to encourage movement in that direction. Thank you, Mr. Chairman.

Senator JEFFORDS. We will now receive a statement from Senator Dodd for the record.

[The prepared statement of Senator Dodd follows:]

PREPARED STATEMENT OF SENATOR DODD

Mr. Chairman. I would first like to compliment you on calling this hearing. As we debate intelligent ways to reduce Federal spending, a hearing focusing on the economic importance of education could not be more timely.

Mr. Chairman, education funding is a subject you and I together have spent a great deal of time on—both in this committee, in the Budget committee and on the Senate floor. While our efforts have not always been successful, I think we have raised awareness about the importance of education as a long-term investment in the strength of our economy. I hope that this hearing can help build on this record.

As you well know, education is important for many reasons. Education enhances the quality of each of our lives and betters whole communities. For millions of individual Americans, it has provided a way up the ladder of economic opportunity. Education also drives economic growth in our country. It is, I believe, one of the wisest investments we make with American tax dollars.

The returns on this investment are improving all the time, as we target Federal dollars to areas of real need. During the last Congress, we amassed an incredible record of achievement in education. We revisited and improved existing programs, like the Title I program for disadvantaged children by targeting these dollars to needier communities and strengthening overall quality. we adopted the Goals 2000 Act to provide new, flexible resources to states and communities as they work to improve their schools. We enacted the School to work act to assist students in the transition out of school.

We provided states and communities with access to new Federal resources to address the problem of school violence. The Direct Loan program simplified the student loan system and lowered costs to American taxpayers substantially. We expanded and improved the Head Start program so that quality will remain high and more young children will have access to this successful program.

We must not back off from these commitments, which help bring the promise of education and the American dream within reach for millions of American families. Not only would a retreat on education go against our best nature, but it would also be foolish economically.

America cannot hope to remain strong without an educated citizenry. This statement is even more true today. With the economy growing increasingly global, our Nation's greatest economic asset is our people. And the best way to cultivate that asset is through education.

In this regard, I look forward to hearing from all of our panelists about their ideas on education and its relation to the economy. I am particularly looking forward to hearing from Mr. Joseph L. Dionne, the Chairman and CEO of McGraw-Hill, who is a resident of Connecticut.

Thank you.

Senator JEFFORDS. Just to follow up on the last question, I think the figures show that business spends about $25 billion a year on remedial education. Obviously, that has to be the function of the school systems, and you ought not to be burdened with that. Then there is an additional $200 billion a year, I believe, spent in skill training.

Do you have any thumbnail estimate or any guess what percentage of that education and training ought to be handled by our schools, or how much of it is related to specific business activities which could not be generalized under the high standards that are being established? In other words, are our schools really deficient in teaching basic skills?

Mr. WURTZEL. Oh, there is no question about that. I cannot give you details, but Motorola—conceptually, that is, in round numbers—wants to start a plant using fairly sophisticated machinery to produce an electronics product. The example I have seen is that in this country, they have to take an entry work force and train them for 6 or 8 or 10 weeks, just to get them to the point where they can begin to read the manuals and operate the equipment.

In Japan or other well-educated countries, they call on the work force, give them the new manuals, send them home to study them, and they come back in a week, ready to go to work.

Obviously, Motorola, in deciding where to place new plants—or IBM or Seamans, and whether they are American-owned or foreign-owned does not matter—if you are going to have to invest 6 or 8 or 10 weeks of remedial instruction just to get people to the point where they can operate equipment, that is an obviously additional burden that causes both American companies and foreign companies to make the decision to invest in new plants where they have a work force that is ready to learn, as compared to a work force here that needs to be brought up to the point that they are ready to learn the particular skill or application.

It is a devastating comment on our education system.

Senator **Jeffords**. That is a very, very devastating comment, and it alerts us to how critical it is that we continue our educational agenda.

Mr. Gorman.

Mr. **Gorman**. There is a far more insidious issue here and set of characteristics at play. In our school systems, we regularly convince more and more kids that they cannot learn, that they are stupid, that they are not like other kids.

We have a plant in North Carolina where we established a program with one instructor, individual computer stalls, where our workers go to be educated—not to be trained in any particular skill, but in English, in arithmetic, in history, and the like. They can learn at their own pace; it is purely voluntary, but the instructor helps teach them how to go about it. We find that the self-esteem of the worker is increased dramatically as a result, and they say, "Hey, I can learn," and "Gosh, I am learning."

We then empower them to think for themselves, instead of treating them like extensions of the machines they tend, and our productivity has gone up dramatically, and our quality has gone up dramatically, with not one, single ounce of training there; it is simply education, which leads to self-esteem, which leads to satisfaction in terms of a job well-done.

Senator **Jeffords**. Thank you.

I want to thank you again. This is critically important, and I am going to do everything I can to improve the public awareness about these problems, whether it be at the national level, with summits, conferees and hearings. So I would appreciate, and I know I will get, the cooperation of both your organizations and yourselves, and I deeply appreciate your testimony.

I would just alert you that there are two other reauthorizations coming up. One, Mr. Wurtzel, I am sure you are aware of, and that is that we will be reauthorizing special education or IDEA this year. That will not be in this subcommittee, but I will be watching that very carefully because it has raised some very difficult questions as to the present methodology utilized.

Second, we will also be reauthorizing the Perkins Vocational Education Act at the end of the year, where many of these issues will become critical again. So we look forward to your leadership and the support of your organizations to help us through this period.

Thank you very much for very excellent testimony.

Mr. **Gorman**. Thank you.

Mr. **Wurtzel**. The business community wants to commend you, Senator, for your leadership in holding these hearings and focusing the Nation on these issues.

Senator **Jeffords**. Thank you.

On our next panel, we will hear from Joseph Dionne and Governor Thomas Kean. Mr. Dionne is chairman and chief executive officer of McGraw-Hill. He also serves on a number of charitable and educational boards, including Hofstra University, the Conference Board, and Advanced Network and Services, Incorporated.

The Honorable Tom Kean has devoted much of his career to education as the distinguished Governor of New Jersey. He launched a number of education reform initiatives, and presently, he is helping Drew University become one of the premier liberal arts schools in the country. Governor Kean is also chairman of Educate America and a board member of the Carnegie Corporation.

I want to thank you both for being here. I would point out that we are also having a meeting of the Budget Committee this morning, and unfortunately, almost all of my members are also on that committee, and their priority, similar to all of ours, is protecting the budget.

Senator Dodd in particular, Mr. Dionne, wanted me to tell you he wished he could be here; but he is a vigorous defender of education, and the Budget Committee makes the first decisions on how we are going to allocate resources.

But I assure you they will be aware of your testimony, and I look forward to listening to you with great interest.

Mr. Dionne?

STATEMENTS OF JOSEPH L. DIONNE, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, McGRAW-HILL, INCORPORATED, NEW YORK, NY; AND HON. THOMAS H. KEAN, PRESIDENT, DREW UNIVERSITY, MADISON, NJ

Mr. DIONNE. Thank you, Senator. I can assure you that in our shop, it would be the same priority.

Good morning, Chairman Jeffords. On behalf of McGraw-Hill, I welcome the opportunity to participate with my distinguished colleague and share my perspectives on the importance of education to the economic security of this Nation.

I commend you for showing the leadership to help focus national attention on this very important issue. I am here today as a business leader, personally and professionally, who has been committed for decades to serving and helping to improve our Nation's education system.

I have taught in the Nation's public schools; I have been a school administrator; I have taught in its universities, and I am a trustee. I serve as chairman of McGraw Hill, which was founded in 1988. McGraw-Hill is a $3 billion leading multimedia publishing and information services company, serving global markets in education, business, industry, the professions and Government.

As a knowledge company, we have a significant interest in education, serving K-12, vocational, higher education and lifelong learning. As a corporation, we have a heritage of supporting the principles of strong education policy.

As a member of the Business Roundtable's Education Task Force and the Association of American Publishers, we have worked for education reform at the K-12 level as well.

Additionally, each year, we at McGraw-Hill present the Harold W. McGraw, Jr. Prize in Education to honor individuals who have positively influenced the field of American education. Winners of this award in the past include Senator Pell, who serves as ranking minority member on this subcommittee, and Secretary of Education Richard Reilly for his work as Governor of South Carolina; and I am delighted that Senator Pell is with us this morning.

Further, I am pleased to serve as co-chair with former Governor Thomas Kean on the Commission on National Investment in Higher Education, and Governor Kean will be discussing the commission in greater detail in a few moments.

I commend to your attention and respectfully submit for the hearing record a paper on "Investing in Higher Education: An Argument for Restructuring," prepared by Judith Eaton, president of the Council for Aid to Education. It serves a valuable role in providing a benchmark for the commission's discussions.

But I am here today also as a consumer of the end product of our higher education system—our employees. McGraw-Hill depends on this Nation's educational system to provide us with employees who have the skills, intellectual rigor and creative thought processes to keep us ahead of the competition. Without that intellectual capital, we cannot compete effectively. It goes to the very core of how we survive and thrive as a Nation, and we as business leaders are here to help meet this challenge.

Most people believe that business is the engine that drives our society. I believe it is not. Education is the engine of growth that allows the economy to perform, and it is even more so the case as we enter the information age.

If the United States is to maintain its competitive edge in the global economy, we must address the current crisis in higher education, and do it now. It is incumbent upon us as citizens, educators, business executives and Government officials to work together objectively to assess the situation, identify practical, equitable solutions, and facilitate their implementation.

Our education system, envied around the world, is based on the very precepts of this Nation: Freedom, openness, egalitarianism, and equal access. Unfortunately, the course that the higher education system is following today and the economic pressures that are coming to bear threaten that heritage and, more importantly, our future.

We have so much to be proud of, but we have much more to do as we face this crucial turning point. The hearing today is an important step.

My colleagues and I have lessons to share from the business community. The last decade has seen corporate America facing many of the same challenges that today affect higher education. We were called upon to examine our processes and operations, reengineer to improve productivity and quality and to reduce costs.

Our focus here, as well, in higher education should be on access, quality and cost. We need to foster reengineering of the higher education process, just as we have done in the private sector, to maintain our competitiveness. In order to ensure that new education funds are spent wisely, we need to evaluate how we are spending the current $200 billion in higher education money and how to strengthen the return on investment of the nearly $2 billion a year that corporate American contributes. And we need to do so without impinging on the academic freedom of our Nation's colleges and universities.

I have not come today with solutions. Rather, as we look out at the landscape of higher education, I want to raise a few issues for your consideration.

The restructuring of education is a classic example of supply and demand. Right now, the demand for education is far outstripping the supply of resources available to satisfy that demand. To balance this equation, we need to either reduce the demand, which may happen as fewer and fewer students can afford the prospect of higher education, or increase the resources we are able to bring to the problem.

One answer is to lower cost by reexamining the productivity and efficiency of the administration of higher education. Essentially, with successful restructuring, administrative productivity should increase, leading to a decrease in operating costs and ultimately to greater accessibility.

To begin, we must evaluate how efficiently we are using the dollars we already have. I would go so far as to say not nearly efficiently enough.

One area where there is a strong similarity between corporate America and the administration of universities is the "silo" decisionmaking where individual departments can make autonomous decisions and run as seperate entities. This is often not the most efficient way to operate, as corporate America discovered in the 1980's when it reengineered itself and became more horizontal.

There are economies of scale to be gained and resources to be maximized when universities and operate as a whole and not as the sum of the parts. This has been an amazingly resilient community of higher education. For over 200 years, it has proven to be very adaptable, and it has really accommodated increasing demands dramatically—only one in 10 went through college by World War II, and 5 in 10 today. But the institution must fundamentally re-think its organizational structure.

As if internal pressures were not enough, the efficiency of university administrations is further threatened by Government regulations. One example, as Vartan Gregorian, the president of Brown University, has pointed out is the 7,000 individual items governing financial aid arising from Title IV alone. To quote Dr. Gregorian, "Whether intended or not, the impact of thousands of regulations is to homogenize and bureaucratize our institutions and dampen the creative spirit of our universities. Worse, many regulations command compliance but do not provide the means, further compromising an institution's already limited financial resources and academic priorities."

I encourage you to work with the higher education community to explore which regulations are most essential, streamline them, and eliminate the unnecessary ones.

We must also invest in the infrastructure of our academic buildings. Significant investments in new technologies, computers and smart labs will be wasted if physical structures are crumbling and wiring is insufficient. I noticed by this morning's headlines that we had better speak up now, otherwise it will all go to the elementary and high schools of the Nation.

There exists an opportunity here for the Government to assist. Through accounting incentives, there should be a means to encourage investment in the maintenance and updating of our educational facilities. I think that would be a worthwhile step.

Equal access for all students who wish to attend college is critical. But we need to make sure that the high school students are adequately prepared to enter college and that entrance to college is based on ability, not affluence. We should expect that the graduating student, the future worker, has the skill sets required to compete effectively in a global economy. As part of this, we need to look at technology.

It is imperative that we give our teachers and instructors the tools and training necessary to better use technology in the learning environment. Only then will we achieve a satisfactory level of student comfort and proficiency with technology, which will be the driving force in the Nation's future economy.

The business community is here, able and willing to assist in the restructuring of American higher education. But truly, we must approach this as a team—the education community, Government, and business.

Thank you for holding a hearing such as this to focus the Nation's attention on these issues and the critical need for affordable and quality education for our future work force.

Thank you for the opportunity.

Senator **Jeffords**. Thank you very much, Mr. Dionne. We will hold our questions until after we have heard from Governor Kean.

[The prepared statement of Mr. Dionne follows:]

Summary of Prepared Statement of Joseph L. Dionne

Most people believe that business is the engine that drives society. It's not. Education is. Education is the engine of growth that allows the economy to perform. If the United States is to maintain its competitive edge in the world economy, we must address the current crisis in higher education now. It is incumbent upon us as citizens, educators, business executives, and government officials to work together objectively to assess the situation, identify practical, equitable solutions and to facilitate their implementation.

Ours is an education system—envied and consumed by the world—that is based on the very precepts of this nation: freedom, openness, egalitarianism and equal access. Unfortunately, the course that the higher education system is following today and the economic pressures that are coming to bear threaten that heritage—and more importantly, the future.

We have much to be proud of, but we have much more to do as we face this crucial turning point. This hearing today is an important step. My colleagues and I representing the business community have lessons to share. The last decade has seen Corporate America facing many of the same challenges that today affect higher education. We were called upon to examine processes and operations, re-engineer to improve productivity and quality, and reduce costs.

As we look out on the landscape of higher education today, there are a number of issues that clearly need to be considered. In order to insure that new education funds are spent wisely, we need to re-think how we are using the current $200 billion national investment in higher education.

—We need to examine administrative and governance issues regarding universities, specifically as they relate to overall productivity. For example, we need to evaluate internal university governance issues, such as department or "silo" decisions that impact overall university performance and external issues such as unfair administrative burdens imposed by the government.

—We must encourage investment in the infrastructure of our academic institutions if they are to remain viable.

—Equal access for all students who wish to attend college is critical. We need to make sure that high school students are adequately prepared to enter college and that entrance to college is based on ability and not affluence.

—On the technology front, it is imperative that we give our teachers the skills necessary to better use technology in the learning environment, and to facilitate student comfort and proficiency with the technology which will be so crucial to the nation's economic future.

The business community is here to support the efforts of higher education and the government to successfully adapt to the dramatically changing environment. I believe it is imperative to the health of this nation that we take action now to insure the accessibility of quality higher education to all Americans if we are to have a well-prepared, competitive workforce.Prepared Statement of Joseph L. Dionne

Good morning Chairman Jeffords and to your fellow subcommittee members. On behalf of McGraw-Hill, I welcome the opportunity to come before you today to participate with my distinguished colleagues on this important panel and to share with you my perspective on the importance of education to the economic security of this nation. I commend you for showing the leadership to help focus national attention on this very important issue.

As Chairman of McGraw-Hill and co-chair, with former Governor Thomas Kean, of the Commission on National Investment in Higher Education, I am here today as a business leader who both personally and professionally has been committed to serving and helping to improve our nation's education system for decades.

Founded in 1888, McGraw-Hill, Inc. is a leading multimedia publishing and information services company, serving global markets in education, business, industry, the professions and government.

Although as a knowledge company, we have a significant interest in education as a market—K–12, vocational, higher education and lifelong learning—our college publishing arm represents only two percent of our business.

As a corporation, we have a heritage of supporting the principles of strong education policy. As a member of the Business Roundtable's Education Task Force and the Association of American Publishers, I have worked for education reform at the K–12 level. Additionally, each year we at McGraw-Hill honor three outstanding individuals who positively influence the field of American education through our Harold W. McGraw, Jr. Prize in Education. Harold McGraw has dedicated himself to improving education and has laid the foundation of McGraw-Hill's support of education issues.I note that Senator Pell, who serves as the ranking Minority Member on this Subcommittee was a prior winner of the Prize, as was Secretary of Education Richard Riley.

Having said this, more than a publisher of major educational, instructional and test materials, I am here as a consumer of the end product of our higher education system—employees. And as such, McGraw-Hill depends on this nation's educational system to provide us with employees who have the skills, intellectual rigor and creative thought processes to keep us ahead of the competition. Without that intellectual capital we cannot compete effectively.

As the makeup of this panel reflects, business leaders have recognized that we must prepare our children to meet tomorrow's challenges. As a nation, we must have well-educated human resources in our companies and organizations who are well-prepared to meet the competitive challenges in this global village. This goes to the very core of how we survive and thrive as a nation. And, we as business leaders are here to help.

You have heard from Joe Gorman and Alan Wurtzel the importance of preparing graduating high school students for higher education and gainful employment. I will focus today on the critical need to reform and re-engineer the nation's higher education system; to control its costs and improve its productivity; bolster its crumbling infrastructures; and assure equal access and quality in higher education. The results of a concerted and successful effort should be a more competitive America.

EDUCATION IS THE ENGINE OF GROWTH

Most people believe that business is the engine that drives society. It's not. Education is the engine of growth that allows the economy to perform. If the United States is to maintain its competitive edge in the global economy, we must address the current crisis in higher education now. It is incumbent upon us as citizens, educators, business executives, and government officials to work together objectively to assess the situation, identify practical, equitable solutions and to facilitate their implementation.

If one needed convincing about the economic magnitude of higher education, I'd like to share with you some salient and brief statistics that Vartan Gregorian, president of Brown University, recently cited:

—At the present, U.S. higher education is a $200-billion enterprise, accounting for about three percent of our nation's gross national product.

—U.S. higher education employs 2.5 million individuals, including 800,000 faculty, more people than the automobile, steel and textile industries combined.

Ours is an education system—envied and consumed by the world—that historically has been based on the very precepts of this nation: freedom, openness, egalitarianism and equal access. Unfortunately, the course that the higher education system is following today and the economic pressures that are coming to bear threaten that heritage—and more importantly, the future.

We have much to be proud of, but we have much more to do as we face this crucial turning point. My colleagues and I have lessons to share from the business community. The last decade has seen Corporate America facing many of the same challenges that today affect higher education. We were called upon to examine processes and operations; re-engineer to improve productivity and quality; and reduce costs.

I am not here today with all the solutions, but to help focus the national agenda on the need to rethink how this money is spent; how to get the most out of the human resources devoted to higher education; how to maintain equal access to quality education for our future employees—and not just for the most affluent; and how to help institutions of higher learning to take "best practices" of management learned from businesses which have restructured in the 1980's to become more competitive.

This is also why I agreed to serve as co-chair of the Commission on National Investment in Higher Education, which Governor Kean will be discussing in greater detail. I commend to your attention a paper on Investing in American Higher Education: An Argument for Restructuring", prepared by Judith Eaton, President of the Council for Aid to Education. It serves a valuable role in providing a benchmark for the Commission's discussions.

The following are a few issues I want to raise today for your consideration.

RE-ENGINEERING

We need to foster re-engineering of the higher education system—just as we have done in the private sector in order to maintain competitiveness. We need to evaluate how we are currently spending our monies, how to maintain the aging infrastructure at our academic institutions, how to strengthen the return on investment that Corporate America gains from its contribution.

More appropriate and ultimately more helpful is an attitude on the part of business that combines serious concern and readiness to share experiences, on the one hand, with the recognition that business practices may not translate directly into academic settings. Perhaps, a more helpful role for corporations—the chief employers of higher education's graduates and partners with higher education in national and local economic development—is to align our policies, pronouncements, and practices regarding higher education more closely with our expectations concerning educational effectiveness and efficiency. And, while we in business contribute a significant amount of financial support—nearly $2 billion in 1993—we must recognize that even a dramatic increase in corporate contributions, private support, and funding from tuition increases will not alone impact the higher cost needs of colleges in the future.

Additionally, it is not prudent for higher education institutions to take for granted the financial commitment the business community already has shown—particularly if Corporate America views the university community as being unresponsive.

SUPPLY/DEMAND

The restructuring of higher education is a classic example of supply and demand theory. Right now, the demand for education is far outstripping the supply of resources available to satisfy that demand. To effectively balance this equation, we need to either reduce the demands, which may happen as fewer and fewer students can afford the prospect of higher education, or increase the resources we are able to bring to the problem. To achieve this we can do one of two things: we can increase our cash intake by attracting more students able to afford a higher education from outside our borders. Our education system already is recognized as the world-leader and it's not a hard sell. These students are more likely than in the past, however, to return to their native countries, and use their knowledge and skills to compete against us. Alternatively, we can lower the costs, build enrollments by U.S. students—and, in turn, maintain U.S. competitiveness—by re-examining the productivity of the administration of higher education. Essentially, with successful restructuring, administrative productivity should increase leading to a decrease in operating costs and, ultimately, to greater accessibility. To begin, we must evaluate how efficiently we are using the dollars we already have.

I would go so far as to say, not nearly enough. One area where this is a strong similarity between Corporate America and the administration of universities is the "silo" decision-making that goes on to the detriment of the whole. Not unlike corporations, individual departments within universities have evolved to have the latitude to make autonomous decisions and run as separate entities. This often is not the most efficient way to operate—as Corporate America discovered in the '80's when it re-engineered itself and became more 'horizontal.' There are economies of scale to be gained and resources to be maximized when universities can operate as a 'whole' and not the 'sum of its parts.' Corporate America discovered that years ago and is willing to share lessons learned which may be applicable to higher education.

As you also are aware, more and more corporations are entering into R & D partnerships with particular departments of higher education institutions. While these are excellent investments in learning which generally produce valuable solutions for business, another unintended outcome is drastically disparate levels of funding within departments of universities. We must explore ways to share within institutions these investments in its parts for the good of the whole.

We also should look at the disparity in corporate giving to institutions—we must not continue on the path towards an elitist educational strata. There should be incentives to encourage corporate giving to a broader array of colleges and universities.

REDUCE GOVERNMENT REGULATION

As if internal pressures were not enough, the efficiency of university administrations is further threatened by, as Vartan Gregorian observes, "a new willingness on the part of government to limit the traditional freedom from central control that has given the American university so much of its historical edge." Specifically, he has pointed out: "Regulations—7,000 individual items governing financial aid arose from Title IV alone—have become a major administrative burden." To quote him further:

"Whether intended or not, the impact of thousands of regulations is to homogenize and bureaucratize our institutions and to dampen the creative spirit of our universities. Worse, many regulations command compliance but do not provide the means, further compromising an institution's already limited financial resources and academic priorities."

I urge you to work with the higher education community to explore which regulations are most essential, streamline them and eliminate the unnecessary ones.

INFRASTRUCTURE ISSUES

We must invest in the infrastructure of our academic buildings. Significant investments in new technologies, computers and smart labs will be wasted if physical structures are crumbling and wiring is insufficient. In the most literal sense, we must continue to build upon the foundation we have laid.

There exists an opportunity, here, for government to assist. It is often the expectation that a wealthy individual only will donate funds for a building if it carries his/her name. Through accounting incentives there should be a means to encourage the investment in the maintenance and updating of our educational facilities.

EQUAL ACCESS

Equal access for all students who wish to attend college is critical. We need to sustain our historic national commitment of financial support to higher education to insure entrance into college is based on ability, not affluence. We as a nation should focus on how to make college affordable, with a reasonable expectation that the output—that is, the graduating student and future worker—has the skill sets required to compete effectively in the global economy. This expectation should be the same for a student graduating from Harvard or Yale, the University of Vermont or the University of Rhode Island. We should not expect only the best- educated students to be produced by the higher cost institutions.

This means we as business, government and congressional leaders, and citizens must join with the higher education administrators to address the cost and infrastructure issues. We must halt the current trend toward a higher level and quality education being made available only to the wealthy.

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TECHNOLOGY

In the business community when we look at updating operations, we look at plant and equipment among other things. I already have addressed the need to take a hard look at our plants or academic buildings, now I am suggesting that we look at the equipment—or more specifically—the technology. On the technology front, it is imperative that we give our teachers the tools and training necessary to better use technology in the learning environment. Only then will we achieve a satisfactory level of student comfort and proficiency with the technology which will be driving the nation's economic future. I again agree with Mr. Gregorian when he says: "We cannot allow our students—to become 'technopeasants,' modern-day serfs, nominally free but disenfranchised by ignorance and fear of prevailing technologies."

CONCLUSION

The business community is here—able and willing—to assist in the restructuring of American higher education. But, we truly must approach this as a team—the education community, government and business. This is not a call for more regulations or mandates on the part of government but rather for the government to use its "Bully pulpit" to focus the university community's attention on this urgently needed change. If we do not make changes now we will end up with an underprepared workforce unable to meet the challenges of an increasing competitive global economy.

We ask that you in Congress and government join with us to spotlight the need for change. We encourage you to continue to hold hearings such as this to focus the nation's attention on these issues, and to encourage university administrators to provide affordable and quality education to our future workforce. We urge you to work with the higher education community to explore other creative, but unintrusive ways for government participation.

I ask my fellow business leaders to join together to create and maintain a forum for sharing "best practices" learned from our management experiences, perhaps something like a privately funded American Productivity Center where best practices can be shared, shaped and applied to higher education.

Thank you again for this opportunity to discuss these matters today. I look forward to working with you, Mr. Chairman, and your colleagues in Congress and government, the leaders in the higher education community and business to grapple with and find solutions to these critical issues. We simply cannot wait any longer or we will risk jeopardizing America's economic future.

JOSEPH L. DIONNE, CHAIRMAN AND CHIEF EXECUTIVE OFFICER

MCGRAW-HILL, INC.

Joseph L. Dionne is Chairman and Chief Executive Officer of McGraw-Hill, Inc. He was named Chairman in 1988 subsequent to his appointment as Chief Executive Officer in 1983.

Prior to his current position, Mr. Dionne was appointed President and Chief Operating Officer of McGraw-Hill in 1981, remaining President until 1993. In 1979, he was named Corporate Executive Vice President, Operations. He also was appointed President of McGraw-Hill Information Systems Company in 1977 and Senior Vice President, Corporate Planning, in 1973.

Mr. Dionne joined McGraw-Hill Book Company in 1967 as Vice President for Research and Development at Educational Developmental Laboratories. A year later, he was appointed General Manager of California Test Bureau and became a Vice President of McGraw-Hill Book Company in 1970.

Prior to McGraw-Hill, Mr. Dionne's experience included teaching, educational administration and consulting work on a number of experimental education projects.

He is a Director of The Equitable Life Assurance Society of the United States; The Equitable Companies, Incorporated; Harris Corporation; and Alexander & Alexander Service Inc. He also is a Director of the Academy of Education Development, the Waveny Care Center, and Advanced Network & Services, Inc., a non-profit organization dedicated to the global advancement of education and research using high-speed communications. He also serves on the Board of Trustees of Hofstra University and The Conference Board.

Mr. Dionne is Chairman of the 1995-96 United Way Tri-State Campaign and serves on the United Way of Tri- State Organizational Board of Governors. He holds B.A. and M.S. degrees from Hofstra University and he earned an Ed. D. in education at Teachers College, Columbia University. He was born in Montgomery, Alabama.

Senator JEFFORDS. Governor, welcome.

Mr. KEAN. Thank you, Mr. Chairman and Senator Pell.

I might begin, if I could, with a word of praise, because this is a political climate I think that too often rewards soundbites and quick solutions, and this is an issue that does not have easy answers. It is difficult and yet very important. So I commend your committee for taking it on.

My focus today obviously will be on higher education. I have seen that issue from any number of perspectives. When I was Governor of New Jersey, higher education was one of my priorities. We made a lot of investments and a lot of changes in higher education, and frankly, I think some of the strength of the economy of the State, I can trace back to some of those investments that we made in higher education. We created jobs.

Now I have a chance to see it from the other side, in a sense, from the inside out. For the last 5 years, I have had the pleasure to serve as president of Drew University. We are a small liberal arts university. We take great pride in the quality of our student body and the high standards we set for them. I also take pride that the number of minority students attending has doubled since I became president; we now have about 20 percent of our student body who are minority students. We have actually increased the number of minority students and increased our standards, which again is a subject I take pride in.

But as much as I am pleased with our success at Drew, it is very difficult for a great number of our students. I have open hours for every week, when I ask, because we are a small place, students to come in with anything that is on their minds. And very often, in their minds is whether they can continue. The stories they tell about what has happened to their families because of layoffs or divorces or deaths is incredible, and often, they see it as denying their chance to complete their college education.

And they are not just minorities—some of them minorities—and they are not just from cities. These are students in the middle class who are having deep problems and do not know whether they can continue to pay those college bills, and all of a sudden, all those dreams they had about being productive citizens are suddenly brought into jeopardy.

And I think any college president could tell you similar stories. These are not just hard luck cases. The situation illustrates what I look for as a looming crisis. The American people in every poll I have seen for the first time are indicating that they do not believe that higher education is necessarily going to be available to their children, even if those children have the ability to succeed in higher education.

T. Rowe Price recently estimated that a parent of a newborn baby today will have to invest more than $450 a month in high-yield stocks for the next 18 years, and then maybe they can send a child to a private college. Families cannot afford that.

It strikes essentially at what you and I know as the American dream, because ever since the GI bill, we have sort of had a feeling in this country that if somebody has the ability, and somebody has the drive, that they ought to be able to get a higher education. And more and more, instead of being the door of opportunity which somebody can march through, it is becoming sort of a stratifier, where the kind of college you go to is dependent not on your ability but on the kind of finances that you can bring to bear.

If this trend continues, Mr. Chairman, I think it could remake us in a way that is not going to be attractive or certainly is not in the Nation's best interest.

The future of our work force is being shaped today, and we have to have a plan to address it. That is why I think your hearings are so absolutely vital. It is not just an academic issue. At no other time in history has the possession of knowledge been such a sign of economic wealth. We are creating wealth with our system of higher education because wealth is now not what we produce, as it has been in the past; it is knowledge, knowledge itself. So we are creating capital in our universities, and the health and vitality of our colleges and universities cannot be separated from the vitality of our economy and the security of the Nation.

Recently, I agreed with my friend Joe Dionne here to tackle some of these issues and become co-chairman with him of the Commission on the National Investment in Higher Education. The commission was formed by the Council for Aid to Education, and we are concerned that higher education must provide greater access and better teaching and that we have got to have better-prepared graduates. We want to examine how well the higher education dollar is being used, and from what source it comes, in order to achieve these goals, or whether it is being squandered by sometimes very well-intentioned but maybe unnecessary or misguided programs. The commission intends to take a critical look at the changes we must make to ensure that colleges and universities broaden themselves to be more in tune with the national needs.

One of our commission's most important concerns is that the prevailing attitude toward higher education in this country, at least among some public officials, seems to have shifted. I am not sure that that is for the better, because from the land-grant universities to the GI bill to the invention of the community college, the Nation's support for higher education has always been seen by people as an investment in the future.

The polls I have seen, including a very recent one, seem to indicate that the people of the country still view it that way. But more and more, it seems that higher education is being viewed less as an investment than as an expense—not a public concern, but maybe just a private concern. And States which have had excellent public institutions—States like California and Virginia—seem to have their backs to the wall, and instead of focusing on how to improve their colleges and universities, are simply looking financially at ways to cut them back and downsize.

It is the same, frankly, with Federal student aid, which has shifted from grants to loans. The result of that commitment is that increasingly, we are putting the burden not on our generation but on the next generation. As we shift that burden, we are doing something fundamental, I think, to the future of the country.

If higher education is looked at as a cost to be cut instead of an investment and a resource for the future, then it is no surprised that the first ones to feel the pain are going to be the most vulnerable, the ones for whom higher education was the only hope perhaps to escape from a situation.

To listen to the kids who sit in my office week after week and tell me they do not think they can afford to continue higher education is very sad. And this view of higher education, if allowed to continue, I think poses a fundamental threat to an economy that increasingly in this world is going to be built on knowledge and on information.

Now, there is a corollary to thinking of higher education as an investment, and that is the question of how we are investing and whether or not we as a society are really getting our money's worth. Our Nation spends $200 billion on higher education, and before we ask anybody to maintain that support, let alone increase it, we should ask the hardest question of all—whether we should be continuing to invest in the status quo, or whether that status quo has got to change.

Too often, for instance, we measure the State of higher education by the top 10 percent of our institutions. But the truth is that the vast majority of our children do not go to these institutions. Most of the institutions they go to are facing very serious financial and educational problems. They are caught in declining revenues, rising demands for services, and while the world class universities can solve their problems by simply attracting the brightest and the best, and they have huge endowments, and that is all very fine, but the majority or vast majority of the institutions our children go to do not have those luxuries.

So I think perhaps we need to consider if higher education needs something similar, as Joe mentioned, to the fundamental restructuring that corporate America has undergone in the last 15 years. Instead of asking how to find new money to finance a fixed set of institutions, we must ask how to transform those institutions, how to make them more efficient and more attractive as a source of funding; instead of focusing on the number of poor or minority students attending universities and colleges, we must ask how we can help these institutions to provide not only the education for these students, but a quality education for all students.

I think we need to think hard about the mission of higher education and whether it is meeting our Nation's new and expanding needs. I am all for university research. I have always backed it. But we are not all research universities. Most places are not. And research universities should not be our model. So we have got to look at and reexamine even faculty compensation systems that reward research at the expense of teaching.

A handful of colleges are starting to ask these questions. Bennington is one of them. They have abolished academic departments and tenure, and set aside 10 percent of each tuition dollar to finance innovative educational programs. That is a small place, and their situation is unique, but we are watching it to see what happens.

Mr. Chairman, it is probably unique for a university president to come before you and say that higher education needs to be reinvented—somewhat like General Motors testifying that we need more public transportation, or AT&T saying, "Reach out and write a letter." I could have easily told you the problem is simply money—but it is not. That is part of the answer, but it is only part of the answer. Maybe, just maybe, that higher education that has served us so well, that system needs to be reinvented.

We have demonstrated a lot of wisdom in reinventing systems in this country. Higher education is very, very important to our future.

I thank you, Mr. Chairman, for taking these problems on, and I commend you for it.

[The prepared statement of Mr. Kean follows:]

Prepared Statement of Governor Thomas H. Kean

Mr. Chairman, members of the committee. Let me begin with a word or two of praise. In a political climate that too often rewards soundbites and the quick fix, I've got to commend you for holding a public hearing on an issue that defies easy answers.

There is no immediate solution to the question of how our educational institutions can best serve the nation's future. But it is a question that must be asked—and explored—with both foresight and vision. I thank you for making it a priority of this subcommittee, and for inviting me to testify.

My focus today will be the role of higher education—and on that issue speak from a number of different perspectives.

When I was Governor of New Jersey, higher education was one of my top priorities. We dedicated resources, initiatives and some of the very best talent in the state to making it better and more affordable. I consider this effort among the most important of my eight years as Governor.

Now I have the chance to see it from the other side—from the inside out. For the last five years I have had the pleasure to serve as president of Drew University in Madison, New Jersey.

Drew is a small liberal arts university, and we take great pride in the quality of our students and the high standards we set for them. We also take pride that the number of entering minority students has nearly doubled in the last five years. Our goal was to maintain high standards and diversify the student body, and we've actually gone one better—we've increased standards and diversified the student body.

But as much as I'm pleased with our success at Drew, I also know it is not easy for many of our students. Students visit my office almost every week to tell me they simply cannot afford to attend our school anymore.

Many of them are minorities. But they're not all from disadvantaged homes. One student told me his parents lost their home to foreclosure so they could keep paying the college bills. It really breaks your heart to talk to these kids. College and university presidents from across the country tell me similar stories.

Now if you look at these students only as hard luck cases, you miss the larger picture of what's at stake. Their situation illustrates a higher education—a crisis of access. And a crisis of access will ultimately translate into a crisis of quality.

We still have the finest system of higher education in the world. But there is no room for complacency when educational opportunities are increasingly sorted according to the type of school a student can afford. It should give us pause when income, not merit, determines whether a student will attend a community college, a public university or an elite private college.

T. Rowe Price recently estimated that a parent of a newborn baby today will have to invest more than $450 a month in high-yield stocks for the next 1 8 years to send a child to a private college. How many families can really afford that?

Ever since the G.I. Bill half a century ago, higher education has served as the great leveler in our country. But more and more it is becoming the great stratifier. Day after day our political and business leaders tell young people that they are the future of this nation. But the message to those kids in my office is that the future is available only to those who can afford it. And if we fail to maximize the talents and skills of all our citizens, it just won't be these students who will lose out. All of us will live with the consequences.

Mr. Chairman, my concern is this: if this trend continues, higher education could remake itself in a way that may not be in our nation's best interest. The future of higher education—and by implication the future of our workforce—is being shaped today, and no one has a plan to address it. That is why your hearings are so important.

And it's not just an academic issue. At no other time in history has the possession of knowledge been so strong an indicator of economic wealth. Today, learning has

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become the country's working capital. It used to be that colleges and universities graduated people to manage capital. Now we look to them to create capital. And so the health and vitality of our colleges and universities cannot be separated from the health and vitality of our economy and society.

Recently I agreed tackle some of these issues when I accepted the cochairmanship of the Commission on the National Investment in Higher Education. I'm happy to see my fellow co-chair, Joe Dionne—Chairman of McGraw-Hill—sitting here with me.

The commission, which was formed by the Council for Aid to Education, believes that higher education in America must provide greater access, better teaching, and better prepared graduates. We will examine how well the higher education dollar is being used to reach these goals—or whether it is being squandered on well-intentioned but misguided programs. The commission intends to take a critical look at the changes we must make to ensure that colleges and universities continue to broaden access and serve our nation's needs.

Mr. Chairman, I'd like to submit for the record an outstanding report on the need to restructure higher education, written by Judith Eaton, president of the Council for Aid to Education. This report will help guide the commission's efforts. And while our work on the commission has just begun, perhaps I could spend my remaining time discussing some of the issues we intend to pursue.

One of the commission's most important concerns is that the prevailing attitude toward higher education has shifted, and we're not sure it's for the better. From the founding of the land-grant universities to the G.I. Bill to the invention of the community college, the nation's support for higher education was seen as an investment in the future. This investment in the nation's brainpower has paid off handsomely—not only for individuals but for society as a whole.

But in recent years it seems that higher education is being viewed less as an investment and more as an expense—less as a public concern and more as a private matter. States with excellent public institutions—like California and Virginia—feel that they have their backs to the wall. Instead of focusing on how to improve their colleges and universities, they are looking for ways to downsize and cut. It's the same with federal student aid, which has shifted from grants to loans. The result is a reduction in society's commitment and a displacement of the burden onto students and their families.

If higher education is looked at as a cost to be cut rather than a resource for the future, it is no surprise that the first to feel the pain are the most economically vulnerable members of society—the kids who sit in my office telling me they can no longer afford college. And if this view of higher education does not change, it poses real dangers for an economy built on knowledge and information.

Now there's a corollary to thinking of higher education as an investment—and that's the question of how we are investing and whether we as a society will get our money's worth. Our nation now spends $200 billion on higher education. Before we appeal for more support from vernment and business, perhaps we should ask the hardest question of all: whether we should be investing in the status quo or whether the status quo itself needs to change.

Too often we measure the state of higher education by the top ten percent of our institutions. But the truth is that most colleges and universities face serious financial and educational problems. They are caught in a squeeze of declining revenues and rising demand for services. And while the world-class universities can solve their problems by attracting the best and brightest faculty and students from here and abroad, the rest of our institutions have no such luxury.

Perhaps we need to consider if higher education needs something similar to the fundamental restructuring corporate America has undergone the last 15 years. Instead of asking how to find new money to finance a fixed set of institutions, we must ask how to transform these institutions to make them more efficient and attractive to new sources of funding. Instead of focusing on the number of poor or minority students attending colleges and universities, we must ask how to restructure higher education to provide a quality education for all students.

We must also think hard about the mission of higher education, and whether it is meeting our nation's new and expanding needs. I'm all for university research and believe it is critical to our economic and intellectual well-being. But political and educational leaders should ask whether the research university model should really be the norm for all colleges and universities—as it has become in recent years. What priority should we place on teaching? How healthy is it that almost every college—large or small—feels an economic pressure to conform to the research-oriented values of world-class universities? Shouldn't we reexamine a faculty compensation system that rewards research at the expense of teaching?

A handful of colleges have begun to ask some of these questions, and others have begun to experiment. One in particular has caught my attention. Bennington College in Vermont responded to a serious financial crisis by abolishing academic departments and tenure, and by setting aside ten percent of every tuition dollar to finance innovative educational programs. Bennington is small and its situation is unique, but it is being watched very closely by leaders of other institutions.

Mr. Chairman, it probably sounds odd for a university president to come before you and say that higher education needs to be reinvented—somewhat like General Motors testifying that we need more public transportation, or AT&T telling people to "Reach Out and Write a Letter." It would have been very easy for me to come here today and tell you that the problem is not enough money. But while that is certainly part of the answer, it is not the only answer. Maybe, just maybe, the higher education system that served us so well in the past needs some fundamental restructuring to meet the needs of the future.

American political and educational leaders have long demonstrated the wisdom and imagination to respond to new challenges, and there is no reason to believe we cannot do likewise today. Mr. Chairman, as our commission develops its findings and recommendations, I will be happy to share them with you. After all, our goal is your goal: to fulfill the promise of American life and to keep our nation healthy and productive for generations to come.

Thank you.

Senator JEFFORDS. Thank you both for very excellent statements.

I am going to turn to my colleague who, if trends in education had continued the way he directed them, why, you would not be here testifying. He is responsible, more than any other one man in this country, for trying to make higher education accessible, and in the heyday of his time, he provided the wherewithal for almost all the funding that was required; now, it is down to maybe 10 or 20 percent of what is required. And that is through no fault of his own, I can assure you.

Senator Pell, it is a pleasure to have you with me.

OPENING STATEMENT OF SENATOR PELL

Senator PELL. Thank you, very, very much indeed, and thank you for your kind words and what you said before I arrived; and I apologize to the audience and to you for being delayed. I have a short statement that I would like to read at this point, and then I have a few questions.

It is of interest, I think, that the chairman is the third Vermonter with whom I as an individual have had the pleasure of working during my service in the U.S. Senate—and the third Vermonter on this committee, which is very, very interesting indeed. The other two were Winston Prouty and Bob Stafford, both individuals of high integrity and purpose.

I worked with Bob Stafford as part of both the majority and the minority—we worked pretty closely together, so that depending on the whims of politics, we were known as the firm of Stafford and Pell, or Pell and Stafford. I believe very much indeed and hope we will become the firm of Jeffords and Pell, or Pell and Jeffords.

We all recognize the importance of an education, but our deeds do not always live up to our words. I think we all agree that the more educated the individual, the better off the individual is and, more important, the better off we are as a Nation. I think Governor Kean mentioned that it is an investment in increasing a Nation's wealth, and he is absolutely correct; the more educated people a nation has, the wealthier, in the real sense of the word, it is.

During a visit to Rhode Island last week, Deputy Education Secretary Kunin made this point clear when she addressed 250 8th graders at Roger Williams Middle School in Providence. Her message was right on the mark. She said: "The more you learn, the more you earn."

Individuals' incomes are, without question, directly related to the education they receive. A recent study released by the Department of Commerce Census Bureau reveals that education does pay off. I do not mean to be crass or mundane, but it is of interest that in 1992, the average yearly income of a high school graduate was almost $19,000. Those with bachelor's degrees earned $32,000, and those with advanced degrees, master's or doctorates, earned $48,000 annually.

The demands of the workplace are likewise related to education. Several years ago, 18 of the 21 highest growth companies in this Nation indicated they needed employees with at least 2 years of education beyond high school. Thus, it is also very clear that our leadership in the world economy will depend to a large measure upon the investment we make in the education of our people.

To quote Plato, "The direction in which education starts a man will determine his future life." Alexander Pope said the same thing: "As the twig is bent, the tree will grow." And I would add that it also dramatically affects the quality of life in our Nation, not only for the present generation, but also for those to come. It is the one legacy we leave behind that has an enduring impact.

Just following upon the thought about the difference between 12 and 14 years, I have one question I would like to put to the witnesses. Why is it that we have the arbitrary thought that after 12 years, general education ceases, and the Government has no responsibility? What caused us to arrive at that figure of 12 at around the turn of the century? I do not know the answer myself, and I wonder, Governor Kean, if you have any ideas.

Mr. **KERAN**. Well, my training is in history, and I do not know the answer; but I think it is a very good question. I do not know, but I suspect it is because it was thought a long time ago that that was all the education that was necessary. Very few people early in the history of this country went to college; those who did, we usually trained to be ministers. So I suspect that 12 years was thought in those days to be enough for anybody, and then they should get back to work, unless you wanted to be a minister, and the Lord would take care of that.

But now, of course, it is totally different—and the public knows it, interestingly enough. As a politician, I always looked at polls; now I look at polls particularly in the education area. And what people are saying, first of all, is that they understand that higher education now may be necessary to reach the American dream for their children. And the corollary, in the same poll, they will say they do not think it is going to be available, and they think the door is shutting, and they think if they are middle class, they children may not be able to have that higher education.

So I think we have an increasing obligation to those people and also to our country to make sure that the higher education which is necessary is there for them as long as they have the ability to make sure of it.

Senator **PELL**. I think we both studied history at the same alma mater; you have a better answer than I did.

Mr. Dionne.

Mr. **DIONNE**. I am also a history teacher, and I understand that history professors are "in" these days, so——

Senator **JEFFORDS**. They are talked about, anyway.

Senator **PELL**. Yes, and they talk a lot, too. [Laughter.]

Mr. **DIONNE**. I think it is quite correct that as an agrarian society, that is how it began. But the real impetus for the 12th grade came about as a result of the Carnegie Commission, the Carnegie units of study, where 16 units were required and 4 years of high school were required to accomplish that. So it was pretty much an invention that came about at that time.

Senator **PELL**. Thank you. I am so glad that you are here. I admire Hal McGraw so much.

Mr. **DIONNE**. He is a great admirer of yours, Senator.

Senator **PELL**. I am very grateful for the Harold McGraw Prize some years ago, and so I welcome you here with enthusiasm.

Mr. **DIONNE**. Thank you.

Senator **PELL**. The question comes up at this time regarding vocational education, which really plays a very real role here. I call them the taxpaying institutions, and yet I realize that many of the errors and foibles in the question of paying back loans come out of the same community. I was wondering if you had any thoughts as to how we can clean up the reputation of vocational education.

Mr. **KEAN**. That is a tough one, and I think that is one of the things we are going to have to look at on the commission, and I do not want to prejudge what our results would be. But I think a number of the things that are being done by those institutions, at least in some States, are also being done by community colleges.

We have an obligation—as you know, there are a number of those institutions that you are talking about that are very fine, that do the job; there are a number of them that are fly-by-night institutions and really are not doing the job for the people who go there and certainly are not repaying the money that comes to those students.

So I do not know the full answer, other than the fact that we have got to police that much better—and not just to get our money back, but in addition because I think the same institutions where the loan rate is so bad are probably the same institutions that are not doing the job anyway for the people who go there.

Mr. **DIONNE**. It turns out that one of our companies is a continuing education center which is involved in home study courses. For years, we have been leaders in the industry in terms of quality standards, and the industry itself has made a lot of efforts to improve its image and its reputation.

I am sometimes concerned about the ease with which individuals can sign up, the fact that there is no accreditation whatsoever for these courses, there is no oversight responsibility. It is quite a concern.

On the other hand, there are thousands of people now who enjoy greater employment than they did prior to having taken these courses. It is a very liberating experience for people who cannot have access directly to universities or community colleges. So it has its positive images.

I think the thing to concentrate on is the administration of the grants, or the administration of the money. I was concerned with the suggestion that $2,600 might be made available for this purpose without the accompanying accountability. Otherwise, I think we will get right back into the situation we were in before, where grants were given and organizations were formed for the expressed purpose of absorbing those grants, and not a lot of education took place as a result of it.

So there needs to be serious thought given to the administration and accountability.

Senator PELL. And I guess your commission will be focusing on this subject a good deal.

Mr. DIONNE. It will now, sir.

Senator PELL. I like the idea, too, that the tax-paying institutions should be given a fair hearing. They have taken quite a rap, some of them, and it bears looking at.

Finally, you both mentioned restructuring or reinventing higher education. Do you have any specific thought in that regard, on one or two items?

Governor Kean.

Mr. KEAN. I have some thoughts on direction. Although higher education is so diverse as you go from the kinds of schools you are talking about to community colleges, all the way up to research universities, I think each one has its own way to restructure, just as you cannot restructure all businesses the same way.

We have already at our small university gotten $2 million just out of the administrative expenses, and I think we are stronger because of it, not weaker. We are a better place than we were, as well as a tighter place, and we have some other things in mind that we are going to do.

I think we have to look at the kind of thing I mentioned in my remarks about teaching still being undervalued in many institutions because too many institutions are still really trying to copy the great research universities. That is not necessarily their job. Their job is to transmit knowledge, and that should be rewarded in a way that it is not necessarily rewarded now.

I think we have got to look at some of the ways we are governed. Joe mentioned that in many of our large institutions, we are really governed department by department. That does not make much sense anymore. It is not the best way to govern anything, and it is very expensive. We have got to do that in a better way.

There are a number of things we can do across-the-board, and then there are very particular restructurings. I can tell you about the restructuring I want to do at our small place. Somebody at a State university would probably tell you the restructuring that has to be done there. But it is all available, it all can be done, and it all, I think, can lower cost to some degree and also improve quality.

Senator PELL. Thank you.

Mr. DIONNE. I think there is perhaps one step that would be very helpful in this regard, and that is American business, in sharing with each other what proved to be successful, has come up with an awful lot of improved productivity.

If an institution like the American Productivity Center were in existence, where best practices were shared among universities, I think you would see a corresponding improvement in the productivity of those institutions. And I think this should be largely a private effort in terms of financing it, but certainly we could use the encouragement of the Senate to create such an entity.

Senator **Pell**. Thank you very much.

Mr. Chairman, I would ask unanimous consent that my opening statement be inserted at the beginning of the statement, after yours.

Senator **Jeffords**. It is granted.

Senator **Pell**. Thank you.

Senator **Jeffords**. Well, thank you both for some very excellent testimony. I find myself in a position where I take this job very seriously, and at a time in our history when I am afraid we are going to make some very bad decisions about the future of the country with respect to resource allocation. We are all worried about our budgets; as you know, we are being forced to look at how to balance the Federal budget. And my deepest concern is that we will all hold hands, and every program will take its cut. Yet any rational analysis would say that if what you are cutting is undermining your ability to raise money and income, it is very counterproductive to be cutting back on those things which will increase your productivity and increase your resource base.

But that is what we are faced with, and we are faced with others who say that the Federal Government should get out of education and turn it all back to the States and local governments, and if you take a look at what may be required to meet real standards, it is going to take a 30 or 40 percent increase in your school budgets back in the States. I am not going to go home and tell my local school board that they have to raise another 30 or 40 percent on property taxes so that our schools can achieve world class standards.

I just wanted to mention that, but also ask you with respect to higher education in particular, what we can do and what we must do to make sure that there is accessible education and financing. But there is also a broader question and one which intrigues me. This Nation is leading the world in the Information Age, and we are making incredible advances. I was over at the Library of Congress the other night, seeing what the CD-ROM capacity is for education and looking at the plans for libraries to convert themselves into a totally different concept of furnishing education to the population. And the same technologies are being placed in the schools. So I thought, well, what a chance for this country to leap forward, and we can then leap ahead of other nations, because we can teach everybody faster. Then I found out, in asking questions, that even though we are the leader in producing the technology, we are not the leader in utilizing it. In fact, almost all of our competitors have much better access to computer technology in their schools than we do. Some of our schools in the more affluent areas are fine, but the average number of computers in schools in the urban districts, which need all the help they can get—they are almost nonexistent.

So I wonder, if you take a look at increasing productivity in higher education, is there anything going on in the utilization of the new breakthroughs in the Information Age?

Mr. **KEAN**. Yes, there is, and because you personalize everything, let me tell you what we are doing at Drew University. We have started a program where we give, just give, as part of tuition each entering student a computer, a modem, and all of that. That is theirs to keep for the 4 years. Everything is plugged into that, so you cannot live on our campus without using it. If the soccer practice is 2 hours later, an E-mail message goes out, so that team had better be checking the computer. The same with theater, the same with every other student activity. Each student's room has voice mail.

We have recently hooked up with fiberoptic cable, so that students' rooms are hooked up to five satellites, so that if the German professor wants to say, Listen to the news from Germany tonight, his students can do so in their rooms.

Now, we are a small place, and you can do these hookups more easily at a small place. But the principle is the same—we believe that unless we graduate people—we think the humanities which we teach will teach students how to think and to adapt, and that is very important—but if they do not also know the new technology, they are not going to be successful in any profession they go into in the next century.

So we believe very, very strongly that it ought to be integrated into the courses, that even humanities courses ought to find ways of integrating computer technology; we encourage that in our faculty, and we have had great success in that regard. Our students are much more employable because of that.

We may be way ahead of the curve, but I think all universities and colleges are starting to move somewhat in that direction.

Let me say also, on your first point, that I could not concur with you more about the need to look very, very carefully at the budget before the cuts. All of us support moving toward a balanced budget. That is something the country supports, and all of us do, too. But I have been part of a number of institutions—I ran a small business, I now run a university, and for 8 years, I ran a State—in all of them, I have had to cut from time to time.

You do not do across-the-board cuts. You really have to look at the value of each program. Some should not be touched at all. Some may have to be eliminated. But to me, when you look at our education system and how important that is, when you look at the fact that for years, to achieve what you and I knew as the American dream, the door was always education. If you were an immigrant, your kids could make it through education. They could be a doctor, a lawyer, whatever they wanted to be—a Congressman. That is disappearing. And if you let that disappear through unwise cuts, you are doing something fundamental to this country, and we are all going to reap the whirlwind.

Mr. **DIONNE**. On the question of technology, I think you would be inspired if you were to visit the college campuses of this Nation. There are any number of them that are very advanced—far more advanced than the universities in the rest of the world. I think the Internet would never have been created without their participation. Most of them have fiberoptics and computer servers, presenting administrative opportunities, but increasingly, course ware is being developed. I could name for you 25 universities that are world class in this regard, and you should feel very good about that.

Senator **Jeffords**. Well, that is good to hear. I wish the same were true for K through 12, which is where our basic problem is. As pointed out earlier, we graduate each year one million functionally illiterate graduates. They graduate from high school with a degree, but some of the standards, such as the ability to read at 6th grade and do math at 6th grade level for a degree, is a very, very serious problem, and it is a serious problem for those who are entering higher education. And many kids who have those law skills, can get into college now. That is very serious.

With respect to availability of post-secondary education through Pell grants, I showed a chart earlier which indicated that in Vermont, the students who are freshmen now, upon graduating, will have twice the debt load of those who graduated last year. Is that trend true at your school as well?

Mr. **Kean**. Yes. And I will tell you, again, as I have my open hours and talk to these students and write recommendations for a number of them who are seniors, that it is affecting their career decisions.

I had a student in my office the other day who wants to be a teacher and hopes someday to be a teacher, but has a debt load that she does not feel enables her to be a teacher right now. She said, "I am going to have to go into something that will earn more money, and maybe, maybe, someday, I can go back to the classroom."

We need great business people, but we also need good teachers, good social workers, we need people in the clergy, we need people in a number of occupations which do not reward people monetarily, and students now are being excluded from those occupations simply because they have this great debt hanging over their heads.

It is very, very serious, and they also get to the point where they cannot borrow anymore. I had a student in my office the other day whose parents are divorced; the father is in bankruptcy; the mother has taken out every loan she could and has now been denied. They just cannot get any more loans. There is a gap. This kid has had 3 years of college and suddenly says, "Maybe I will not be able to complete the fourth. Maybe what I want to do with my life will not happen because of that." That is the tragedy, and I think that is going on on college campuses all over the place.

Mr. **Dionne**. At the university at which I serve as a trustee, Hofstra University, we created a special fund for 3rd-year students who are unable to make it through, and it has been really important to us in that regard. It is an increasing problem.

In the paper which we would like to submit with our testimony, there is a quantification of the decline of Federal support for education as well as State. It is d1 year by year and source by source, and it is a very clear picture of declining commitment.

Mr. **Kean**. What is happening is that as the Federal and State governments have declined the commitment, colleges and universities are trying to pick it up, so they are increasing scholarships from their own funds. And it comes to a point where it is almost a losing game as you try to put more and more of your own resources, and unless you have an enormous endowment, you eventually reach the point where you are really robbing Peter to pay Paul; you are taking resources away from the education of the kids just so you can have the kids there for the education.

Senator **JEFFORDS**. There is a cost-saving suggestion floating which will save billions of dollars by doing away with in-school subsidies for college students. Do you have any comment on that?

Mr. **KEAN**. Well, the proposal I have seen—I will tell you about the State of New Jersey—would cost students in the State of New Jersey alone—this is simply one State—but it would cost $20 million a year for our students, on top of everything else. It would mean a number of them would not be able to continue, and it would certainly deny graduate work to a number of them.

I would hope that this whole panoply of aid to education that has been developed over a large number of years and serves different kinds of services, I would hope that Congress would look carefully at the whole thing before they make decisions simply on a budgetary basis.

The poll that I saw this morning indicates that aid to students in college scholarships is second only to Social Security in the support of the American people, and that that support goes across conservatives and liberals, and politically, it is what you and I would call a "hot button." I mean, people get very upset if they think that people are not going to be given the scholarship aid to attend higher education.

Senator **JEFFORDS**. The last question. We have a declining number of our graduates from college who are getting on into graduate school and being replaced to a large extent by foreign students who are coming here. What, in your view, is the reason for that? Is it, on the one hand, the inability to meet the skill standards that are required? Is it the financial consequences of new graduate school loans on top of outstanding undergraduate debt?

Mr. **KEAN**. I think it is a combination. People graduate from school with a large amount of debt. Very often they say, therefore, they will put off graduate school until they can work for a little while and then maybe come back when they have paid off some of the debt. Well, a lot of them do not come back; they get off into other areas. That is part of it.

Part of it I think is skill. We have some enormously able people, particularly from Asia, coming to our universities who are, frankly, better prepared than many of the students who are applying from our own country.

So I think it is a combination—I think you put your finger on it—it is a combination of skills and knowledge and of cost. And the Asian students, in my experience, are willing to work enormously hard. There is a different cultural aspect. In my experience, if you ask American students who are doing well, they will say and their fellow students will say, "Well, they are very bright." If you ask an Asian student, he or she will say, "No; I work very hard." There is a difference.

Mr. **DIONNE**. I think it is right to say there is a cultural phenomenon here, at least in part, because we generally believe as a society that after you have your undergraduate degree, it is better to go out and work for a while, get some real life experience and then go back for an additional degree. So that is one reason it is deferred in this society as compared to others.

The second thing is that this is particularly acute in areas like science and mathematics, and part of the reason for that is this country's attitude toward the engineering profession. We gear up to accomplish Sputnik, and then we dismantle; and then we gear up for defense, and then we dismantle; and we gear up, and we dismantle. Students are very bright, and they notice this, and they decide that it is hardly worth a candle to commit in that area, so they go off and do other things. So it is very hard to plan a long-term future in a democratic environment. But over time, they have learned this, and I think they are making their own appropriate decisions.

Senator JEFFORDS. Thank you both very much. It has been very excellent and very helpful testimony. I look forward to working with you to continue our efforts to do what we can for education.

Thank you very much.

Mr. KEAN. Mr. Chairman, thank you.

Mr. DIONNE. Thank you for having us.

Senator JEFFORDS. Let me now introduce the members of our third panel, each of whom brings unique expertise to the debate about education and competitiveness.

Dr. Robert Kominski comes to us from the Census Bureau, where he is the assistant division chief for social and demographic statistics. Much of his professional work focuses on educational statistics.

Dr. Morton Schapiro is dean of the College of Letters, Arts and Sciences at the University of Southern California. He is also co-director of the Project on Economics of Higher Education and has written extensively on the topic.

Dr. John Bishop is an associate professor of personnel and human resource studies at Cornell University. Prior to his position at Cornell, Dr. Bishop was director of the Center for Research on Youth Employment and Employability and associate director for research of the National Center for Research on Vocational Education.

The final witness is Dr. Kent Lloyd, chairman and chief executive officer of the Knowledge Network for All Americans. This amazing organization is a nonprofit venture which promotes education and research using highspeed communications.

Thank you all for being here. I look forward to your testimony. We will start with you, Dr. Kominski.

STATEMENTS OF ROBERT KOMINSKI, ASSISTANT CHIEF FOR SOCIAL AND DEMOGRAPHIC STATISTICS, U.S. BUREAU OF THE CENSUS, WASHINGTON, DC; MORTON OWEN SCHAPIRO, DEAN, COLLEGE OF LETTERS, ARTS AND SCIENCES, UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA; JOHN H. BISHOP, ASSOCIATE PROFESSOR, CORNELL UNIVERSITY, ITHACA, NY; AND KENT LLOYD, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, KNOWLEDGE NETWORK FOR ALL AMERICANS, ARLINGTON, VA

Mr. KOMINSKI. Thank you, Senator, for the opportunity to appear before the subcommittee this morning.

Since the Census Bureau began routine measurement in the 1940's, the educational attainment of the United States' population has continued to rise, and is currently at an all-time peak. In 1993, four-fifths of all persons ages 25 or older had completed high school, and over 20 percent had earned a bachelor's degree or more.

When we examine the earnings of individuals cross-classified by their education, we see there is a strong relationship between these two factors. Based on data obtained from the 1993 current population survey, administered by the Census Bureau, we are able to show that mean annual earnings in 1992 ranged from a low of $12,809 for high school dropouts to a high of $74,560 for persons with a professional degree such as an M.D. Other levels of education fall into line with this relationship. For example, high school graduates earned $18,737; persons with some college but no degree made $19,666; associate degree holders on average made $24,398; bachelor's degree holders earned $32,629; master's degree holders made $40,368; and persons with doctorate degrees averaged $54,904.

Data from the CPS confirms that the strong relationship between earnings and education not only exists in average across the entire population, but within age ranges or at different points of the life course as well. Looking at the working population across 10-year age intervals of ages 25-34, 35-44, 45-54 and 55-64, we see the same strong earnings-education relationship within each age group.

It is possible, using the average earnings within these age-specific groups, to compute the possible returns to a given level of education over the course of a hypothetical 40-year working life, that is, between the ages of 25 and 64. Doing this, we can see the effects of the education-earnings relationship compounded over time.

Worklife estimates derived using this method show strong differences for educational levels. For instance, high school dropouts would make about $609,000 over their working life, and high school graduates would make about $821,000, while persons with some college but no degree would make $993,000. Associate degree recipients would make about $1,062,000; bachelor's degree holders, $1,421,000; master's degree holders, $1,619,000; doctorate degree holders, $2,142,000; and persons with professional degrees, $3,013,000.

This estimation method that the Census Bureau has used assumes that 1992 earnings levels would stay in effect throughout one's lifetime. But the reality is that the value of the dollar changes over time. Recent history shows that the value of higher levels of education has risen faster than lower levels.

Comparing 1975 returns to education to those in 1992, we see that average earnings doubled for high school graduates; rose about 2½ times for those with a high school degree only; almost tripled for holders of a bachelor's degree, and more than tripled for those who held advanced degrees.

Keeping in mind that the consumer price index was about 2½ times in 1992 what it was in 1975, these results indicate that the earnings of high school dropouts did not even keep pace with inflation, and high school graduates barely managed to stay even. Real wages rose only for persons with education beyond the high school level.

If these patterns continue, earnings differences between low and high levels of education may become even more dramatic than current patterns indicate.

Thank you.

Senator **JEFFORDS**. Thank you very much.

[The prepared statement of Mr. Kominski follows:]

PREPARED STATEMENT OF DR. ROBERT KOMINSKI

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When we examine the earnings of individuals cross-classified by their education, we see that there is a strong relationship between these two factors. Based on data obtained from the 1993 Current Population Survey, administered by the Census Bureau, we are able to show that mean annual earnings in 1992 ranged from-a low of $12,809 for high school dropouts to a high of $74,560 for persons with a professional degree, such as an M.D. Other levels of education fell into line with this relationship. For example, high school graduates earned $18,737; persons with some college but no degree made $19,666; Associate degree holders on average made $24,398; Bachelor's earned $32,629; while Master's degree holders made $40,368; and persons with Doctorate degrees averaged $54,904.

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It is possible, using the average earnings within these age specific groups, to compute the possible returns to a given level of education over the course of a hypothetical 40-year "working life", that is between the ages of 25 and 64. Doing this, we can see the effects of the education-earnings relationship compounded over time. Worklife estimates derived using this method show strong differences for educational levels. For instance, high school dropouts would make about $609,000 over their life, and high school graduates would make about $821,000, while persons with some college but no degree would make $993,000. Associate degree recipients would make about $1,062,000; Bachelor's degree holders, $1,421,000; Masters degree holders, $1,619,000; Doctorates, $2,142;000, and persons with Professional degrees, $3,013,000.

This estimation method assumes that 1992 earnings levels would stay in effect throughout one's lifetime, but the reality is that the value of a dollar has changed over time. Recent history shows that the value of higher levels of education has risen faster than lower levels. Comparing 1975 returns to those in 1992, we see that average earnings doubled for high school dropouts, rose 2.5 times for those with high school degree only, almost tripled for holders of Bachelor's degree, and more than tripled for those who held advanced degrees. Keeping in mind that the consumer price index was 2.5 times in 1992 what it was in 1975, these results indicate that the earnings of high school dropouts did not even keep up with inflation, and high school graduates barely managed to keep pace. Real wages rose only for persons with education beyond the high school level. If these patterns continue, earnings differences between low and high levels of education may become even more dramatic than current levels indicate.

Senator **JEFFORDS**. Dr. Schapiro.

Mr. **SCHAPIRO**. Thank you.

This testimony is on behalf of myself and my co-author Michael McPherson. We have been invited to comment on the relationship between tuition charges and college enrollment and to describe the effect of college enrollment on lifetime earnings.

We considered first economic returns to higher education. Postsecondary training contributes to labor force skills at a variety of levels. Considerable evidence—we just heard some a couple minutes ago—exists that the economic returns to a college education have risen in the last 15 years. This is reflected in a widening gap between the earnings of workers whose terminal degree is a high school diploma and those who continued on to college. High returns apply at all levels of postsecondary education.

The earnings gap has widened between those with some college and those with none, as well as between college graduates and those with some college.

What accounts for these higher returns? Are they likely to be a transient phenomenon? Although fluctuations in the number of people entering the labor force plays some role, the main source of higher returns to education has been on the side of the demand for labor, a result of the rapid pace of technological change in the U.S. economy.

Those parts of the economy which rely less on college-educated labor, such as farming and heavy industry, have declined in importance, while industries which use more college-educated workers and have been driven in a major way by technological change, such as financial services and high-tech manufacturing, have grown.

Continuing rapid technological change implies that this trend is likely to continue, and thus the economic payoff to higher levels of education is expected to be substantial for the foreseeable future. Hence, from the standpoint of economic efficiency and growth, the Nation will require and continue to require high levels of investment in human skills.

We turn now to the impact of college costs on enrollment decisions. Our own empirical research and our review of other studies lead us to stress two points. First, students' decisions to enroll in college are sensitive to the net price they pay. Higher tuition charges or reduced student aid have a measurable and nontrivial effect in discouraging enrollment, while reduced charges or increased student aid encourage enrollment.

Second, enrollment effects are concentrated on lower-income students—and here, by "lower-income," we mean below family income of about $25-$30,000. Our study, which examined the impact of fluctuations in prices and aid levels on U.S. college enrollment over an 11-year period, showed that a $100 increase in the net cost produced about a 2 percent decline in the enrollment of lower-income students but had no observable effect on the enrollment of middle or upper-income students. The observation that lower-income students are more responsive than others to price changes is consistent with the findings reported in studies by many other researchers.

Another aspect of the cost question is the impact of college prices on enrollment destinations of college students, as opposed to whether they attend any college at all. Much of the popular discussion regarding where students go involves students from middle-income backgrounds. It is widely believed that increases in private tuitions have caused a massive exodus of middle-income students out of private higher education and into public colleges and universities.

We recently completed a study of the income backgrounds of American college freshmen over the period 1980-1993 and uncovered a rather different story. We did not find a redistribution of middle-income students from private to public institutions. In 1980, 21.5 percent of middle-income students were enrolled at private 4-

year colleges and universities. In 1993, 21.2 percent were in those institutions.

The most striking movement among middle-income students has in fact been within the public sector, with a sharp decline in the share of middle-income students at public 2-year institutions, offset by growth in the share of middle-income students at public 4-year institutions.

Indeed, the increasing concentration of low-income students at public 2-year colleges suggests a worrisome trend. It implies that rapid public tuition increases, along with limitations on Federal student aid, are combining to deny many low-income students access to public universities and 4-year colleges, in effect limiting their postsecondary choices to community colleges and trade schools.

The main role of the Federal Government in higher education has been to widen the educational opportunities of those people least able to afford college. With public tuitions on the rise and a growing economic need for college-trained workers, it is urgent that Congress concentrate its energies and the Nation's limited resources on fulfilling this role.

Thank you.

Senator JEFFORDS. Thank you very much, Dr. Schapiro.

[The joint prepared statement of Mr. Schapiro and Mr. McPherson follows:]

JOINT PREPARED STATEMENT OF MORTON OWEN SCHAPIRO AND MICHAEL S. MCPHERSON

Our charge is to comment on the relationship between tuition charges and college enrollment, and to describe the effect of college enrollment on lifetime earnings. We will argue that the strong link between postsecondary training and income, the strong link between federal financial aid and the price of higher education, and the strong link between the price of higher education and the enrollment of students from low-income families, imply that the government policy regarding financial aid is critical from both an economic and a social perspective.

Certainly no aspect of the evaluation of federal student aid has attracted more attention than the question of its impact on enrollment levels and patterns. Although it is important to note that affecting enrollment is not the whole justification for student aid, the aim of promoting the enrollment of targeted groups has been central to the case for federal student aid throughout its history.

A great many studies over the years have used data for a sample of students in a particular year to estimate the impact of price or net cost of education on students' postsecondary education decisions. A minority of those studies have tried to measure specifically the effect of student aid on enrollment decisions, with the rest focusing on the impact of tuition price. Although the studies differ widely in data sources and estimation techniques, they tend to agree on two main points. First, student decisions to enroll in college respond positively, and nontrivially, to price cuts or aid increases. Second, decisions about where to attend school also respond non-trivially to changes in the relative prices of schooling alternatives.

In our own empirical work presented in chapters 2 and 3 of our 1991 Brookings Institution book, Keeping College Affordable, we examine the aid enrollment rate relationship over time while taking account of differences in the experiences of different income groups and genders. Blacks and other races are excluded from this analysis because sampling variability due to small samples from these races in the Current Population Survey make these data points inappropriate for time-series analysis at the level of disaggregation we wish to employ. Therefore the results we report here are limited to whites only.

Our results indicate that increases in net cost over time lead to decreases in enrollment rates for low-income students. The magnitude of the coefficient on net cost implies that for lower-income students a $100 net cost increase results in an enrollment decline of about .68 percentage points, which is about a 2.2 percent decline in enrollment for that income group.

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While our estimate of the magnitude of the enrollment responsiveness to changes in cost differs slightly from the average of econometric studies based on cross-section data, the important point is that our econometrically controlled time series analysis supports the view that changes in cost lead to changes in enrollment for low-income students.

We found a very different picture when we looked at the behavior of more affluent students. We found no evidence in these data that increases in net cost inhibited enrollment in these income groups.

This analysis indicates that changes in the net price facing lower-income students have significant effects on their enrollment behavior. An important policy issue, however, is whether changes in federal aid in fact wind up changing net cost. If for example, increases in federal aid were to lead to decreases in the amount of aid awarded by institutions or to increases in tuition, the effect of aid on net cost would be muted. However, in a separate empirical analysis of the effects of student aid on institutions (Keeping College Affordable, chapter 4), we found no evidence that these potential offsetting effects are empirically important. The time series evidence on net cost further suggests that periods when federal aid is generous coincide with periods when the net cost facing low-income students is lower. This supports the view that these potential offsets are not an important factor.

In sum, our analysis supports the hypothesis that federal student aid has significantly affected enrollment patterns in U.S. higher education over the past two decades.

Our evidence indicates that student aid matters: when student aid lowers the costs facing lower income students, it tends to encourage higher enrollment. Policy makers must carefully consider potential enrollment effects when determining student aid policy.

A second implication is that, consistent with what most observers would expect, changes in net cost have larger effects on the enrollment behavior of low-income than of higher-income students. Indeed, we did not observe any consistent effect of changes in net cost on the enrollment levels of middle- and upper income students. To the extent that federal student aid policy aims to increase college enrollments, this finding supports the case for targeting student aid on lower-income students.

Trends in gross price, need-based aid, and merit aid all affect the affordability of different types of higher education for different types of students. While a great deal of attention has been paid by higher education researchers to the question of "access"—whether students from various economic backgrounds attend college, less attention has been paid to the question of "choice"—where do these students go.

We have just completed a study on the distribution of college students by income background in an attempt to address the often elusive issue of choice in higher education.[1]

Much of the popular discussion regarding where students go involves middle income students. It is often suspected that students from middle income backgrounds have been most affected by the considerable real increases in tuition at private colleges and universities. Students from lower income backgrounds qualify for need-based financial aid, lessening the chance that these students experience an affordability problem. Students from upper income backgrounds receive a different but analogous form of financial aid—parental contributions that do not require major proportions of available annual incomes. But, the story goes, when tuitions rise faster than other economic indicators, students from middle-income backgrounds are forced to switch to less costly educational alternatives.

Our study of the income backgrounds of American college freshmen over the period 1980-1993 casts doubt on parts of this analysis. In one sense, there has been such a melt: the share of middle income students (defined as the group with real family incomes of $30,000 to $100,000 in 1992 dollars) in all of higher education has declined. Our data cannot tell us whether this overall decline represents changes in national income distribution (fewer families in the middle class and more either rich or poor as a result of the Reagan-Bush years) or differential changes in enrollment rates (middle income students increasing their college enrollment rates less than students from richer or poorer families). But what most people seem to mean by middle income melt is something different from this: a redistribution of middle income students among categories of institutions, and especially from private to public institutions. Our data do not find middle income melt in this sense over the 1980-1993 period. In 1980, 21.5 percent of middle income students were enrolled at private four-year colleges and universities; in 1993, 21.2 percent were in those institutions.

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[1] Michael S. McPherson and Morton Owen Schapiro, "College Choice and Family Income: Changes Over Time in the Higher Education Destinations of Students from Different Income Backgrounds," November 1994.

The most striking movement among middle income students has in fact been within the public sector, with a sharp decline in the share of middle income students at public two-year institutions, offset by growth in the share of middle income students at public four-year institutions. Indeed, one of our most interesting findings is the increasing representation of low income students at public two-year colleges, and the declining representation of middle and upper income students there. It is of course important to remember that the relatively young, first-time full-time freshmen represented in our survey are not the predominant clientele at community colleges. Nonetheless, these data do seem worrisome. They suggest that the combined effects of tuition increases and limitations on federal student aid may be impairing the ability of low income students to gain access to institutions other than community colleges.

It is revealing also to look at changes in the enrollment patterns of upper-income students. Higher income students in 1993 were more likely to attend universities (either public or private) than they were in 1980. These increases for universities (and for public four-year colleges as well) came largely at the expense of private four-year colleges, whose proportion of high-income students fell from 26.7 percent to 23.6 percent. Meanwhile the proportion of middle-income students who attend private four-year colleges has been a basically stable from 1980 to 1993. Although leaders at these schools have been vocal in talking about middle income melt, it appears that what they have experienced is in fact upper-income melt. It seems likely that this loss of full-pay students is a significant part of the explanation for the growing investments of these schools in tuition discounting and non-need based aid discussed above.

Among the implications that can be drawn from these various trends, one stands out that is of special importance for higher education's future role. This is a pattern of increasing stratification in several senses. Low-income students are increasingly concentrated in community colleges, perhaps because a pattern of rising tuitions not matched by student aid increases is pushing the cost of other public alternatives out of reach. Private universities are pulling away from private colleges in their ability to attract high income students. Other research we have done suggests to us further that the most selective and prestigious among private universities and liberal arts colleges are increasing their distance from most other private institutions, which are locked in a tense struggle for enrollment and resources.

Since World War II, postsecondary education on a massive scale has made itself indispensable to the normal workings of our society—gatekeeper for the professions, training ground for all manner of skilled work, core generator of scientific and technological advances, and locus of scholarly endeavor and cultural critique. At the same time, the principle of universal access to higher education has become an essential symbol of the nation's commitment to equality of opportunity.

Postsecondary education contributes to labor force skills at a variety of levels. Considerable evidence exists that the economic returns to educational investments have risen in the last fifteen years. This is reflected in a widening gap between the earnings of those with high school educations and those with higher levels of education. These high returns appear to apply at all levels of postsecondary education—the earnings gap has widened between those with some college and those with none as well as between college graduates and those with some college.

What accounts for these higher returns? Are they likely to prove a transient phenomenon? One source of the higher returns is temporary - a result of changing demographics. Returns to higher education were depressed in the late 1960's and early 1970's as a result of the very large cohorts of college-educated workers who appeared in the labor force a that time, as the baby-boomers matured. Since then, the decline in numbers of young persons entering the labor force has produced something of a shortage of young college-level workers, and this has contributed to increased returns. The impact of this force can be expected to diminish as the "echo" of the baby boom leads to larger cohorts of young people in the decades ahead.

This supply side effect, however, does not appear to be the main explanation for higher returns. Rather, most of the action has been on the side of the demand for labor, and appears in fact to be a result of the rapid pace of technical change noted above. Katz and Murphy have shown that rising demand for better educated workers has been driven by the relative expansion of industries which have higher demands for educated labor. That is, those parts of the economy which rely less on college-educated labor (farming, heavy industry) have declined in importance, while industries which use more college-educated workers (financial services, "high-tech" manufacturing) have grown.

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Continuing rapid technical change implies that this trend is likely to continue, and thus the economic payoff to higher levels of education is likely to continue to be high for the foreseeable future.

Hence, from the standpoint of economic efficiency and growth, the nation is likely to require high levels of investment in human skills.

The impact of rising demands for human skill and knowledge has important implications for economic inequality. As we have noted, the high returns to education over the last two decades have produced a growing gap between the wages of more and less educated workers. Many observers have worried that this tendency is producing a dangerous social divide between a small class of highly trained analysts and professionals and a growing group of undereducated and underemployed workers. There is a lot of evidence from international comparisons that our educational system does relatively well by the highest achieving students and that our largest failures, cognitively and later economically, are with students in the bottom half of the distribution of academic achievement. One way of combating this inequality is to invest more of the skills and knowledge of those people who do not under present arrangements attend four-year colleges and universities and attain bachelors' degrees. Concern for this group calls for improvements at the high school level for students who are not college-bound as well as for improving the availability of high-quality non-collegiate postsecondary alternatives, such as vocationally oriented programs in community colleges and trade schools. It is important also to improve access to four year colleges and universities for those among disadvantaged students who have the motivation and qualifications to attend them.

The main role of the federal government in higher education has been to widen the educational opportunities of those people least able to afford college. With public tuitions on the rise and a growing economic need for college-trained workers, it is urgent that Congress concentrate its energies, and the nation's limited resources, on fulfilling this role.

Senator JEFFORDS. Dr. Bishop?

Mr. BISHOP. Thank you for giving me this opportunity to testify. I have longer remarks that I would like to be included.

Senator JEFFORDS. They will be included in the record.

Mr. BISHOP. Thank you.

I will concentrate on the quality dimension as opposed to the number of years of schooling dimension which the two previous speakers spoke about.

Compared to seniors in Northern Europe and East Asia, we lag behind substantially in math, science, foreign languages, and geography—but surprisingly, maybe, not in reading, and also maybe surprisingly, given the way the discussion goes, our primary school students are not lagging behind in reading and science, and they do lag somewhat behind in math.

So to the extent that we have a quality problem, at least compared to the rest of the world, the problem is a secondary school one.

Second, we no longer lead the world in terms of proportion of age cohort graduating from high school. Much larger proportions of age cohort graduate from high schools in Northern Europe than in our country.

We still lead in terms of B.A.s as a proportion of the age cohort getting B.A.s, but a larger share of our B.A.s are in nonscientific and nonengineering fields. So if you look just at engineering and science, computer science, the bachelor's and master's degrees, in those areas we do not lead; we are sort of in the middle of the pack, in fact, slightly below the average.

Now, does this matter? It matters a lot. We have heard about the effect of years of schooling. I would like to mention just a few things about the future of these returns.

In the past when we have had very strong markets for college graduates, that causes a huge increase in the number of students, and that has then dumped a lot of people on the market. That happened in the 1970's, and a lot of them could not find jobs. Will that happen again? I have looked at that, and it is not happening, and it will not happen.

The reason is in fact the supply has not gone up. In 1974, the ratio of the number of people getting B.A.s to employment was 1.09 percent. The most recent year, 1992, it is .96 percent. It has fallen by about 15 percentage points. And it is projected to fall in the future, by the year 2000 and the year 2005.

Why is that happening? The reason is the age cohort has shrunk. The size of the 20 to 30-year-old age group is a lot smaller now than it was in the past relative to population, and so even thought that group of people is going to college in greater proportion, there are fewer of them.

The second factor is that more and more retirees are college graduates now, because we are now retiring that cohort of people who got a college degree under GI bill.

So consequently, in fact, the growth of supply of college graduates is slowing, and that, put together with a continuing rapid increase in demand for college graduates on the part of business has meant that that is what has caused this rise in the return to college in the last 15 years, and it is likely to continue to cause further increases.

Not only has the return to college gone up; the return to knowing more, holding years of school constant, has gone up. So that the return to knowledge of math is now higher than it was 10, 15 years ago.

Let me give you a little information about how big those returns are. If we imagine an experiment where the competence in terms of test scores of people graduating from high school went up by one grade level equivalent, essentially the difference between the average score of 11th-graders and 12th-graders on a test, that raises their earnings on average over the course of their lives by about $1,000 a year, and that has a present discounted value, including the compensation effects, in that they also get higher fringe benefits and so forth, of $20,000 to $30,000, is the present discounted value at 5 percent real or 8 percent nominal interest rates, which is roughly the current bond rate of such a benefit.

The effects are small when you are very young, but they grow quite rapidly and they are quite substantial by the time you are 30.

Another kind of evidence is productivity growth effects. I have looked at the effects of the test score decline on our productivity growth during the 1980's and 1990's and calculated that essentially GDP was lowered by 2 percent because the strong positive trend in test scores that had been in existence prior to around 1965 ended.

So what is there that you can do to improve our education? Let me just point to a couple of things. One is to move further down the path we have already started of establishing standards and encouraging States to set up curriculum-based examinations. New York State currently is the only State with a system of curriculum-based examinations, the Regents exams. And guess what—when you look at the SAT scores of New York State students, holding constant their family background, they are higher than any other State.

Canada has some provinces with curriculum-based exams, other provinces without them. The provinces with curriculum-based exams at age 13, 4 years before the students would be taking these exams, the provinces with exams holding family background constant, the students perform about six- to eight-tenths of a grade level equivalent higher.

The effects of this kind of stimulus are very substantial. The strategy that needs to be followed particularly is to increase the rewards for achievement for youngsters and for schools. This strategy is already working. Essentially, that is what has happened in the last 15 years. The payoff to colleges doubled, the payoff to math has gone up. Employers are paying more attention to academic achievement when they are making hiring decisions. Colleges are taking a look at how tough the courses are that students are taking. That has caused a major change in the culture of our secondary schools.

In 1980, 33 percent of 13-year-olds said they either did not get assigned homework or did not do it. Now that is only 9 percent. In 1980, 32 percent of the kids said they did one or more hours of homework each night; now it is 66 percent.

On top of that, we have had big increases in the proportion of students taking algebra-II, geometry, chemistry, physics, all the tougher college prep courses. And this has had an important effect that I do not think people realize. The NATE math scores are now 1.06 grade level equivalents higher than they were 10 years ago in 1982. The science scores are 1.22 grade level equivalents higher. In other words, we have already accomplished essentially a $1,000 increase in the earnings of our graduates in just 10 years. Now, that is coming back from a terrible decline of about that magnitude in the 1970's, so we are just undoing the damage that was done in the 1970's, but it has been accomplished in the face of a substantial increase in the minority share of student bodies and a lot of other difficulties that schools have had to do with.

So that by following along this path of increasing rewards for achievement, that has induced the kids to work harder, the schools to take the academic side of their mission more seriously; that has resulted in greater achievement. And the numbers that I present in the paper suggest that if this had not happened, and we had stayed essentially one grade level equivalent below what we would have otherwise been—that thought experiment, what is the benefit to the society—discounted at 5 percent real, 8 percent nominal interest rate, it is $2 to $3.4 trillion.

Thank you.

Senator JEFFORDS. Thank you very much.

[The prepared statement of Mr. Bishop follows:]

John H. Bishop
Cornell University

IMPROVING EDUCATION:
HOW LARGE ARE THE BENEFITS?
HOW CAN IT BE DONE EFFICIENTLY?

> *"The fate of empires depends on the education of youth"*
> *–Aristotle*

> *If your plan is for one year, plant rice. For ten year plant trees.*
> *For a hundred years, educate women and men.*
> *–Kuan'-tse*

The Problem

The National Assessment of Educational Progress (NAEP) reports that 92 percent of high school seniors cannot "integrate specialized scientific information" and do not have "the capacity to apply mathematical operations in a variety of problem settings." (NAEP 1988a p. 51, 1988b p. 42) According to the 1992 National Adult Literacy Survey, only 23 percent of adults are able to reliably determine correct change using information from a menu (National Center for Education Statistics, 1994 Table 1.3).

Secondary school completers in Northern Europe and East Asia are considerably better prepared in mathematics, science and foreign languages than their American counterparts. Figures 1 to 4 plot the scores in Algebra, Biology, Chemistry and Physics during the early 1980s against the proportion of the 18-year old population in the types of courses to which the international test was administered (Postlethwaite and Wiley, 1994). The Americans who participated in the Second International Mathematics Study were high school seniors in college preparatory math courses. This group, which represented only 13 percent of American 17 year olds, was thought roughly comparable to the 15 percent of youth in Finland and the 50 percent of Hungarians who were taking college preparatory mathematics. In Algebra, the score of 40 percent correct for this very select group of American students was about equal to the score of the much larger group of Hungarians and substantially below the Finnish score of 79 percent correct (McKnight et al 1987).

The findings of the Second International Science Study are similar. Take Finland and Canada, for example. The 41 percent of the Finnish students who were taking some biology in their senior year of secondary school got 50 percent correct. The 28 percent of English speaking Canadians taking biology got 43.7 percent correct. The 12 percent of Americans taking a second biology course in senior year got 38 percent correct. The 16 percent of Finns and the 25 percent of English speaking Canadians taking chemistry knew almost as much as the 2 % of American high school seniors who were taking their second year of chemistry (many of whom were in "Advanced Placement") (Postlethwaite and Wiley, 1994).

(Figure 1-4 about here)

It is sometimes said that low achievement is the price one must pay for greater access. While the share of all adults with high school diplomas is higher in the U.S. than in other nations, this is no longer the case for young adults. Table 1 presents data on the ratio of secondary school diplomas awarded to population for a variety of industrialized countries. The ratio is over 100 percent in Denmark, Finland and Germany, 90 percent in Japan, 85 percent in France and 65 percent in England. Despite the minimal standards for getting a diploma

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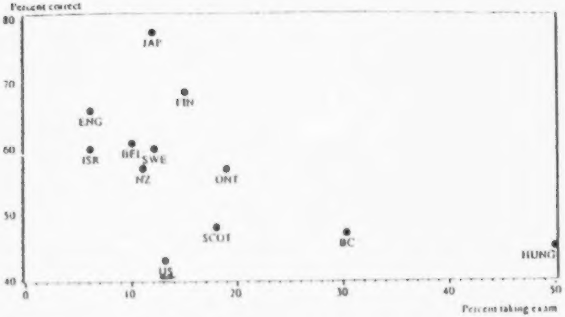

Fig. 1. Algebra results for 17-year-olds

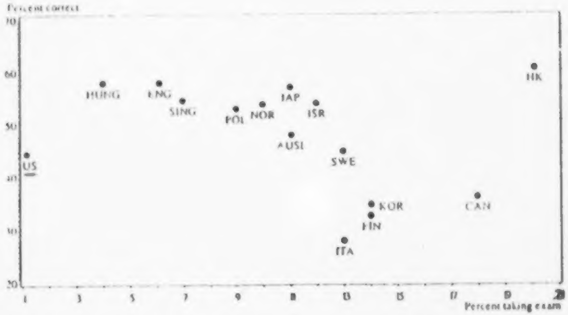

Fig. 2. Physics results for 18-year-olds

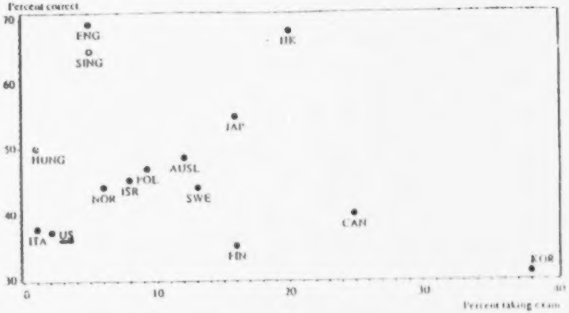

Fig. 3. Chemistry results for 18-year-olds

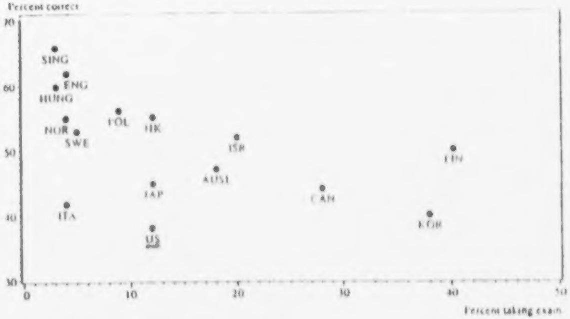

Fig. 4. Biology results for 18-year-olds

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in the United States, the ratio of secondary school diplomas awarded to population 18 years of age was only 73.7 percent in 1988, slightly below its level in 1968.[1] Standards were lowered in the 1970s, but completion rates did not improve.

Table 1

Graduation Rates for Secondary and Postsecondary Education

	Sec. Dipl /Pop18	Bachelors /Pop22	Sci,Eng,Math Deg/Pop2534		Sec. Dipl /Pop18	Bachelors /Pop22	Sci,Eng,Math Deg/Pop2534
Australia	---	24.4%	8.2%	Italy	76%	9.2%	2.6%
Canada	73%	33.3%	6.2%	Japan	91%	23.7%	9.7%
Denmark	100%	16.5%	6.7%	Netherlands	82%	8.3%	2.5%
Finland	125%	17.2%	7.0%	Norway	99%	30.8%	7.9%
France	76%	16.3%	7.2%	Sweden	80%	12.0%	4.0%
Germany	117%	13.3%	6.8%	United Kingdom	74%	18.4%	7.7%
Ireland	51%	16.0%	8.8%	**United States**	**74%**	**29.6%**	**6.5%**

Source: OECD, Education at a Glance, 1993, p. 176, 179 & 185. Column 1 is the ratio of secondary school diplomas and credentials awarded in 1991 to population 18 years of age. It exceeds 100 percent in Denmark, Finland and Germany because older individuals from larger birth cohorts are completing their secondary schooling and because some individuals obtain two secondary level credentials (eg. In Germany some recipients of the Abitur pursue 3 year apprenticeships which yield vocational qualifications). The third column is 10 multiplied times the ratio of science, mathematics, computer science and engineering degrees awarded in 1991 at all levels (BS, MS and PhD) to the labor force 25 to 34.

Participation in postsecondary education is higher in the United States (see Table 1), but most college freshmen are studying material that European university students studied in secondary school. Many Europeans doubt that BAs from second rank American universities are equivalent to the French *Licence* or the Dutch *Doctoraal examen*.

In the economically critical fields of science, mathematics, computer science and engineering, degree production relative to population exceeds U.S. levels in Japan, Norway, France and Ireland. Finland, Canada, Denmark, and Germany produce proportionately just about as many people trained in these fields as the United States. Only Italy, the Netherlands and Sweden are distinctly below the U.S. Many observers believe that the abundance and quality of scientists and engineers has historically been an important source of competitive advantage for American companies. This advantage is diminishing.

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[1] If GED certificates were counted as diplomas, American secondary school graduation rates would be about 10 percentage points higher. The labor market, however, does not view the GED as equivalent to a high school diploma. GED certified high school equivalents are paid 6 percent more than high school dropouts but 8 to 11 percent less than high school graduates. Most GED test takers spend little time preparing for the exam. The median examinee spent 20 hours preparing for the exam and 21 percent did not prepare in any way. Their ASVAB test scores are above those of other high school drop outs but significantly below those of high school graduates. (Cameron and Heckman 1993). Hence, the OECD did not think GED certificates should be counted as high school diplomas.

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I. THE ECONOMIC CONSEQUENCES OF EDUCATION

1.1 The Effect of the Quantity of Schooling on Wages

Educational attainment is the single most important determinant of a person's success in the labor market. According to the most recent Census report, persons over the age of 18 without a high school degree earned only $12,809 on average in 1992, a poverty level standard of living for a family of three. **High school graduates earned 46 percent more than drop-outs** or $18,737 on average. **Associate degrees holders earned 30 percent more than high school graduates** or $24,398. on average. **Bachelors degree holders earned 31 percent more than those with AA degrees**, or $32,629. on average. **PhDs earned 68 percent more than BAs and those with professional degrees earned 128 percent more than BAs** (Census Nov. 1994). Only a third or so of these wage differentials are caused by pre existing differences in ability, motivation and family background.[2] The lions share of the gains represent the real value added of extra schooling. In the 50 years we have tracking it, the payoff to schooling has never been higher.

Is there a danger of over doing the expansion of higher education? Newspaper stories about laid off managers and professionals led some to mistakenly announce the end of the strong labor market for college graduates. While the 1991-92 recession saw a cut back in the hiring of recent college graduates, young high school graduates suffered even more. Even at the height of the recession unemployment rates of college graduates never exceeded 3.5 percent. Their unemployment rates are now less than 2.5 percent.[3] Those who completed their BA in 1994 were quite successful in getting good jobs.

What about the future, however? Let us begin by looking at projections of the supply of college graduates. The high economic payoffs to college during the late 1980s and 1990s resulted in a big increase in the ratio of BAs awarded to the number of 22 year olds--from 21.6 percent in 1980 to 29.9 percent in 1992. This ratio is projected to increase further to 33.8 percent in the year 2000, a 56 percent increase over 1980 (NCES Jan. 1995). The proportionate increase in the total number of BAs awarded, however, is much smaller because the low birth rates of the 1960s and 70s means that there are significantly fewer individuals in the 20 to 30 year old age cohort that typically receives most of the BAs. As a result, the ratio of the number of BAs awarded to total employment fell from 1.09 percent in 1974 to 0.95 percent in 1980 and 0.96 percent in 1992. It is projected to fall even further to 0.88 percent in 2000 and 0.86 percent in 2005. Thus, despite the technology driven shift in employer demand in favor of college educated workers, the flow of new graduates into the labor market has declined. To make matters worse the number of college graduates retiring from the labor force is increasing every year (as the veterans who went to college under the GI bill retire from the work force). As a result, the ratio of workers with a college degree to those with a high school degree or less is projected to grow at only 2.9 percent per year between 1988 and 2000, significantly below the 3.5 percent per year growth of this ratio between 1980 and 1988 and the 4.9 percent per year growth between 1972 and 1980 (Bishop 1992).

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[2] Corrected estimates of private returns to schooling can be obtained by including measures of ability in the model (Griliches and Mason 1972; Taubman and Wales 1975, Hause 1975) or by using sibling data to match people on ability and socioeconomic factors (Behrman et al. 1977; Olneck 1977). Corrected estimates of rates of return must also take into account downward biases introduced by errors in measuring schooling (Bishop 1974; Griliches 1979) and the probability that those who choose to continue schooling face higher rates of return than those who do not (Willis and Rosen 1979). When models correcting for omitted variables and selection effects were estimated in the 1970s, impacts of years of schooling were typically smaller than in simpler models but the effects were still quite strong. Ashenfelter and Krueger's (1992) recent studies employing comparisons of identical twins which correct for the biasing effects of measurement error in schooling found the effect of schooling to be about as large as the standard cross section relationship.

[3] Unemployment rate of managers and professionals, which was 2.0 percent in the first quarter of 1989, rose to 3.5 percent in September 1992 and have since fallen to 2.2 percent by November 1994. The unemployment rate of operatives and laborers, which was 7.7 percent in the first quarter of 1989, rose to 11.4 percent in July 1992 and has returned to 7.7 percent in November 1994.

Now let us examine projections of the demand for college educated workers. In 1991 Shani Carter and I published two papers forecasting a continuation of upskilling trends (Bishop and Carter 1991; Bishop 1992). These papers employed a regression analysis of changes in occupational employment shares during the 1972 to 1991 period to project future occupational employment shares. The variables found to have significant effects on occupational shares were: a simple trend, the unemployment rate, the merchandise trade surplus as a proportion of GDP, and the ratio of personal computers used in business to total employment. The personal computer variable captures the accelerated introduction of computer technology during the 1980s as well as the direct effects of microcomputers. The preferred model containing all four variables predicted that managerial, professional and technical jobs will account for 68 percent of growth of occupational employment between 1990 and 2005. Dropping the variable representing the share of the work force with a PC on their desk lowers the projected high skill share to 57 percent and dropping both the trade deficit and PC share lowers it to 52.5 percent. So far these projections are pretty much on track. Managerial, professional and technical jobs accounted for 59 percent of the 6,728,000 increase in jobs between November 1989 and November 1994.[4]

If, as predicted by our models, the relative demand for college educated workers continues to grow at rates similar to those that prevailed in the 1960s, 70s and 80s, current very high wage premiums for college education will continue and may even escalate further. The latest data (presented in Figures 5a and 5b) support the predictions made 4 years ago of continuing escalation of the wage differential between college graduates and high school graduates. The earnings of male college graduates fell slightly from 1989 to 1992. But the wages of high school graduates fell even more, so the payoff to getting a college degree grew dramatically. For females, there were increases in both the earnings of college graduates and the differential between high school and college graduate. The present discounted value (PDV) at age 21 of the earnings plus fringe benefit gains

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[4] The BLS projects that managerial, professional and technical jobs will account for 40.9 percent of job growth to the year 2005.. However, the BLS method of projecting occupational changes has consistently under predicted the growth of managerial and professional jobs. They start with an assumption--the occupational composition of employment in individual industries will not be radically different in the year 2005--that is manifestly wrong. A few *ad hoc* adjustments are made to the occupational compositions projections for 2005, but most of these parameters are taken as fixed. This results in a substantial understatement of upskilling trends. In 1981 the BLS projected that professional, technical and managerial jobs would account for 28 percent of employment growth between 1978 and 1990. Data from the Current Population Survey indicate that these occupations, in fact, accounted for 53.6 percent of 1978-90 job growth.

Figure 5a

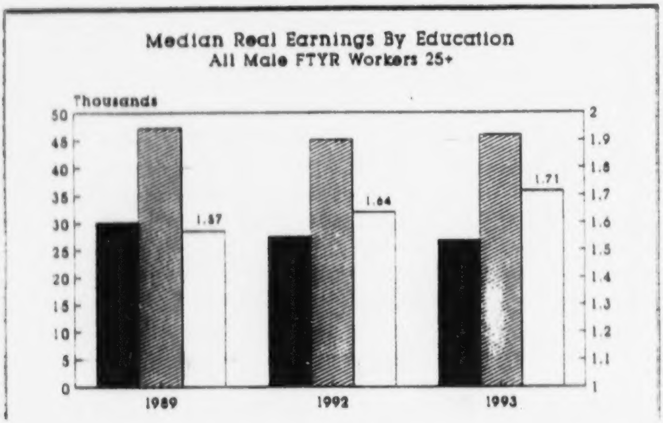
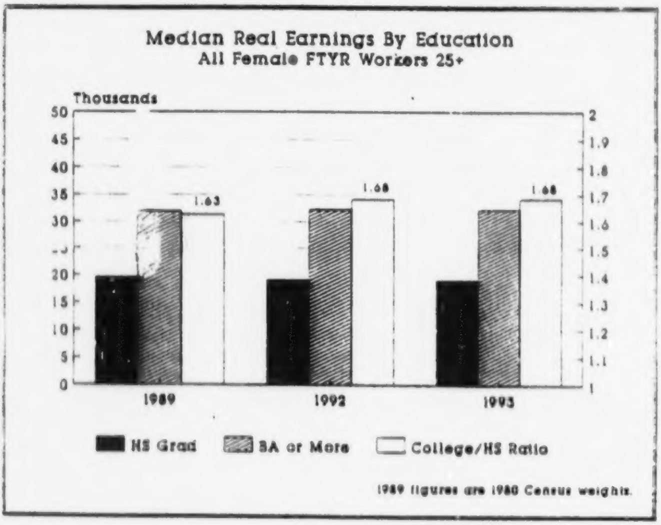


Figure 5b



associated with a college degree are $360,000 of which at least $240,000 represents real value added.[5] A four year college education entails approximately $37,500 in student time costs and $54,500 in instructional costs (OECD 1993 Table P6). Consequently, the social benefits of a college education are at least 2.5 times the social costs.

Clearly increases in the quantity of schooling have high social payoffs. Most of the policy debate, however, is about the quality dimension. How would improvements in student achievement affect the economy? It is to this I now turn.

1.2 The Effect of Education Quality on Wages and Productivity

The mathematical, scientific and technical competencies of workers have big effects on:

- their wages and earnings,
- their productivity on-the-job and
- the nation's standard of living and competitiveness.

Each of these will be taken up in turn.

1.2.1--Consequences for Wages and Earnings

Academic achievement has major effects on the wages of adults even when years of schooling are held constant. In the Department of Education's literacy survey, high school graduates who are in the top 5 percent in quantitative literacy earn more than twice as much as high school graduates who are in the bottom 15 percent of the literacy distribution. Holding years of schooling constant, a grade level equivalent increase in quantitative literacy raised 1992 annual earnings by 5.7 percent or about $900. annually (NCES 1995 Table 4.7). The present discounted value (PDV) of the increase in compensation resulting from a one GLE increase in quantitative literacy is about $20,100 (see Table 2).

Analysis of a higher wage group, household heads in the Panel Study of Income Dynamics, found that increases in general academic achievement raised earnings by about 4 percent or $1400. annually per GLE (Bishop 1989). The PDV of the increase in compensation resulting from the one GLE achievement gain was about $31,300 in 1993 dollars.

A third study has examined the effect of different types of academic and technical competencies on hourly wage rates and annual earnings of young people in 1981, 1982, 1983, 1986, 1989 and 1991 (Bishop 1994). The effects of a one population standard deviation [approximately 5 Grade Level Equivalents (GLE)] increase in various kinds of achievement are presented in Figures 6a, 6b. 6c and 6d. At the time of the 1991 interview

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[5] All of the present values calculated in this paper assume that employer paid taxes on labor and fringe benefits sum to 25 percent of earnings, working lifetimes are 45 years on average and a 5 percent real rate of discount. Thus the formula for PDV = [earnings differential]*1.25*20*.895. The calculations also assume no growth in the magnitude of the differential being valued. In reality both inflation and productivity growth will cause all wage differentials to grow over time at roughly the rate at which nominal wages grow. This means that our calculations are conservative and comparable to PDV estimates which assumed nominal wage growth of 3 percent per year and which use an interest rate of 8 percent, the current coupon on long term government bonds.

Table 2
Alternative Estimates of the Present Discounted Value of Earnings and Productivity Effects of 1 Grade Level Equivalent of General Academic Achievement (Holding Years of Schooling Fixed)

	Female/	Male	
	Clerical	Tech Abil not Incl.	Tech. Abil Included
Weekly Earnings of Adult Household Heads (Panel Study of Income Dynamics--Bishop 1989)	---	$32,000	---
Annual Earnings of the Employed (NCES Literacy Survey 1994)	$20,100	$20,100	---
Earnings of Youth--17-26 yr olds in 1981-85 (Nat. Long. Survey of Youth--Bishop 1994 Chap 5)	$ 6,900	$ 2,900	$10,600
Earnings of Young Adults--25-32 yr olds-- (1990 NLS-Y--Bishop 1994 Chap 5)	$18,200	$13,400	$23,500
Skill Qualification Tests in Military Holding Job Fixed (Maier & Grafton--Bishop 1994 Chap. 7)	$22,400	$16,100	$31,900
Performance Ratings in Civilian Jobs-Job fixed (General Aptitude Test Battery--Bishop 1994 Chap 8)	$14,200	$15,600	---

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Estimates of the present discounted value (PDV) at age 18 (using a 5 percent real discount rate and a 45 year working life) of the compensation and productivity effects in 1992-93 dollars of a one grade level equivalent (GLE) increase in general academic achievement (GAA) while holding years of schooling constant. By comparison the instructional cost of one year of school was $5566 in 1992-93. PDV is calculated assumming that the earnings/productivity differential is the same in every year of the individual's working life. Compensation (including employer paid taxes on labor) is assumed to be 25 percent greater than earnings. A grade level equivalent is defined as equal to 1/5th of a PopSD. General academic achievement includes computational speed, mathematical reasoning, verbal ability and science knowledge. Results for a broader definition of GAA that also includes mechanical comprehension and technical knowledge is presented in column 3. Spatial ability, perceptual ability, clerical speed and psychomotor skills were not considered part of GAA and their effects were controlled for in the GATB analysis. All models reported here included controls for years of schooling. Only the PSID analysis corrected for errors in measuring GAA, so estimates presented in rows 2 to 6 are lower bounds of true effects. The results presented in row 3 and 4 are from earnings regressions and reflect in part higher probabilities of employment and the on-the-job training received since leaving school (Bishop 1994). Earnings effects of GAA grow with age, so estimates of lifetime effects are larger when based on 25 to 33 year olds (see row 4). The results presented in row 5 and 6 are from within job regressions estimated in data on non-professional and non-managerial occupations. Since job is held fixed, they underestimate the total effect of GAA. The dollar estimates of productivity effects in military jobs was constructed by assuming that average productivity of soldiers in clerical jobs was the same as the compensation of civilian workers in comparable jobs.

Figure 6a

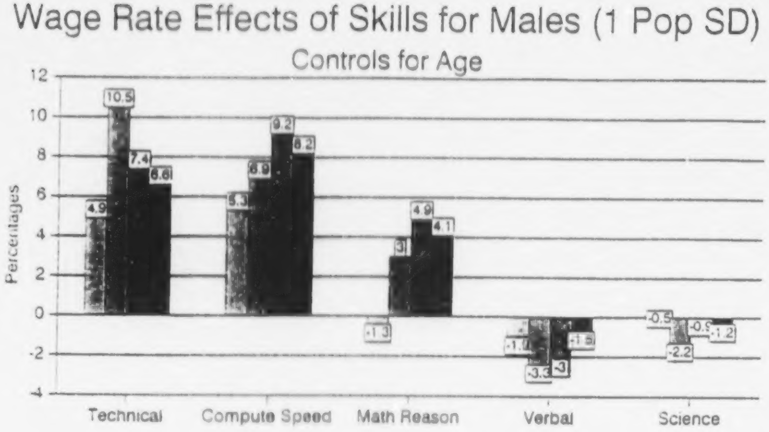


Figure 6b

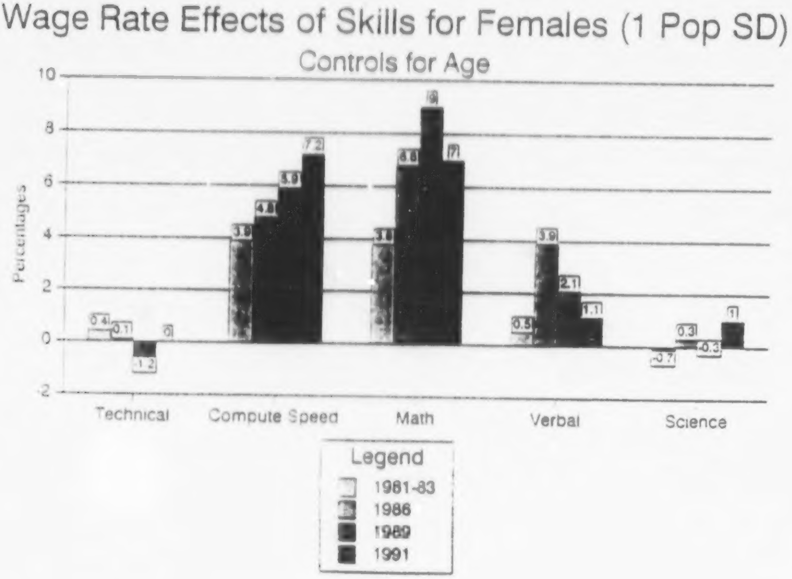


Figure 6c

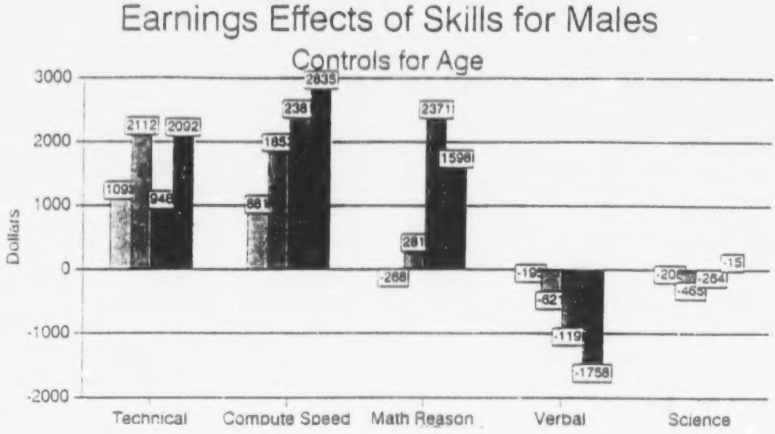
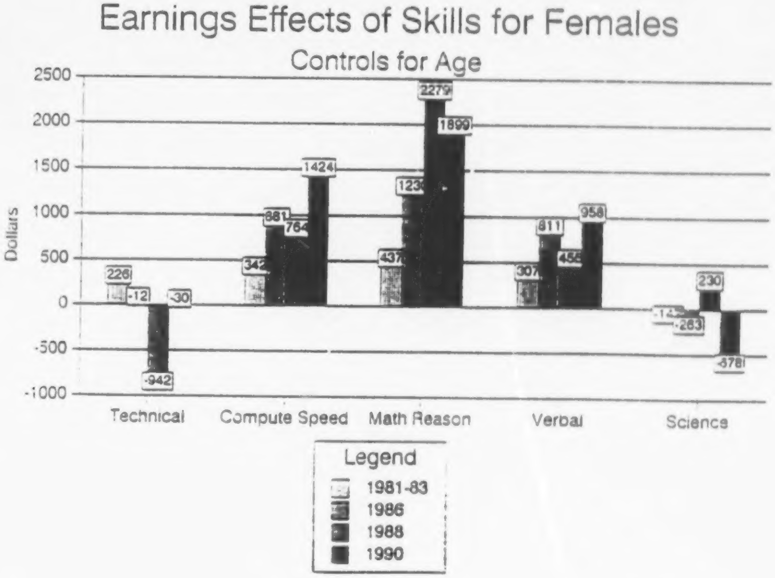


Figure 6d



this sample of NLS Youth ranged from 26 to 33 years of age.

For young women, speed in arithmetic computation and mathematical reasoning ability both had substantial effects on wage rates and earnings. A one GLE increase in both raised wage rates by 2.3 and 2.8 percent in 1986 and 1990 respectively and earnings by 4.8 and 5.2 percent respectively. Verbal competence had somewhat more modest positive effects on wages (+.5 percent per GLE) and earnings (+1.5 percent per GLE). Knowledge of technology and science had no significant effect on wage rates or earnings. A one GLE increase in all competencies raised annual earnings by $715. in 1990.

For young men, technical competence, math reasoning ability and speed in arithmetic computation raised wage rates and earnings, but verbal and scientific competence did not. A one GLE increase in all competencies increased earnings by $956 in 1990. Table 2 summarizes a variety of estimates of PDV in 1992-93 dollars of the compensation increase that the models predict will result from a one GLE increase in all types of competence holding years of schooling constant. Row 4 presents estimates of the effect of basing the analysis on 1990 outcomes when the sample was 25 to 32 years old. The PDV of a one GLE improvement in test scores is $18,200 for women and $23,500 for men. These estimates are lower bound estimates of the total effects of a one GLE increase in academic achievement. Nevertheless, they are many times larger than the instructional costs for one year of elementary and secondary schooling--$5,566.

Rewards for academic achievement are small at first but grow with age. Academic achievement improves access to jobs offering training and enables workers to get more out of the training. Furthermore, academic achievement is poorly signalled to employers so there are long delays before the labor market identifies and rewards workers who because of their academic achievements are exceptionally productive workers. Measures of non-cognitive achievement in high school such as rates of attendance, extracurricular activities and an absence of discipline problems also fail to have positive effects on initial success in the labor market for the non-college bound in High School and Beyond data (Hotchkiss 1985, Bishop, Blakemore and Low 1985, Rosenbaum 1989).

An important implication of this analysis is that **mathematical and technical skills of average workers generate much greater wage and productivity benefits than verbal and scientific skills.** Analysis of 1984-85 annual earnings using NLSY data found that a one PopSD increase in both computational speed and mathematical reasoning ability raised annual earnings of young women (men) by $1174 ($1097), some of it coming from a higher probability of being employed. The effect of a one PopSD increase in verbal (science) achievement on annual earnings was only $147. (-$91) for young women and -$150 (-$124) for young men. A one PopSD increase in technological knowledge increased earnings of young men by $1343 (Bishop 1991b).

1.2.2--Consequences for Productivity on the Job

Direct estimates of the relative importance of different competencies can be obtained by estimating models in which measures of job performance in military and civilian jobs are regressed on scores on a variety of tests assessing academic and technical competencies. Figures 7 and 8 present the results of two studies of the training sucess and job performance of Marine recruits (Sims and Hyatt 1981, Maier and Grafton 1981). The

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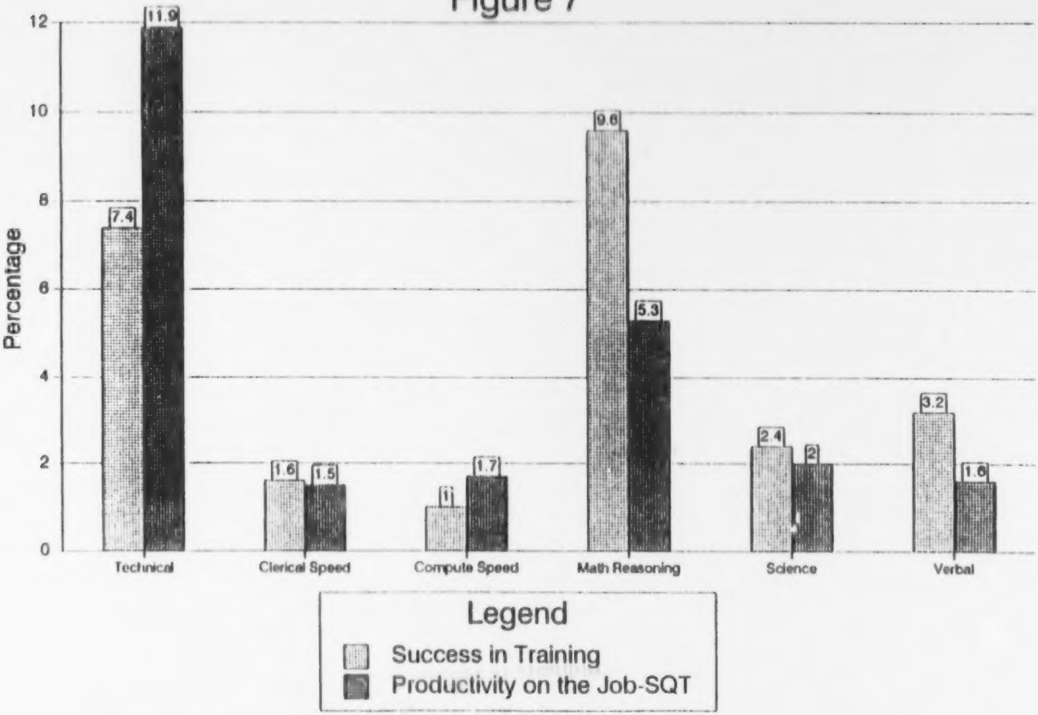
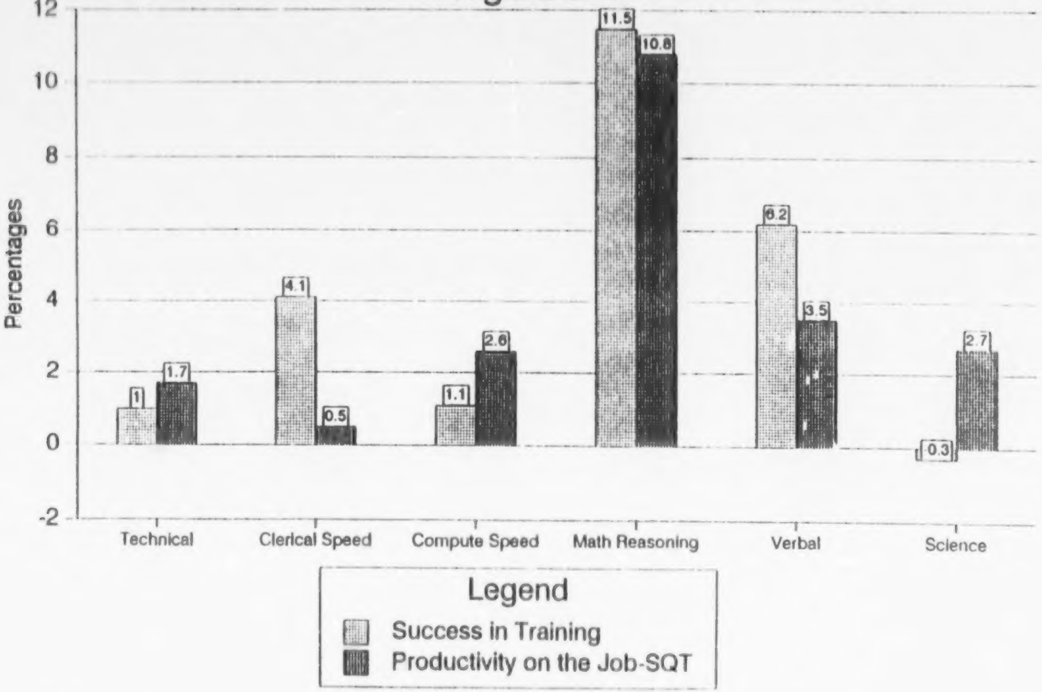
Effects of Skills on Productivity in Non Clerical-Non Combat Jobs

Figure 7



Effects of Skills on Productivity in Clerical Jobs

Figure 8



darker bars provide estimates of the effect of a one population standard deviation improvement in each of the ASVAB subtest composites on the hands-on job performance (SQT), while holding all other test scores constant. The lighter bars provide similar estimates from models predicting paper and pencil measures of job knowledge at the completion of training. In non-clerical jobs in the military a one PopSD increase in a technical skills raised productivity 11.9 percent and a similar increase in mathematics reasoning skills raised productivity by 5.3 percent. The other skills had much smaller effects on productivity. In clerical jobs in the military, a one PopSD increase in math reasoning ability raised productivity by 10.8 percent and a similar increase in verbal skills raised productivity by 3.5 percent.

Studies of job performance in civilian jobs get similar results. Competence in mathematics has major effects on supervisory ratings of performance in all jobs. Technical competence has big effects in blue collar and technical jobs. Verbal ability has no effect on performance in blue collar jobs, but in clerical, technical and service jobs, it makes important contributions to productivity.

Not only does competence in mathematics help you get high paying jobs, it makes you more productive in specific jobs, even in clerical jobs such as typist which casual observation suggests require verbal skills not mathematics skills. Why? I think the reason math (including algebra) has such a pervasive effect on worker productivity is the logic and problem solving skills that people learn in mathematics courses. These skills help clerical workers learn word processing and other computer programs and helps them solve other everyday problems at work.

The PDVs for general improvements in academic and technical achievement range from $14,200 for women in clerical jobs to $31,900 for males in non-clerical jobs in the military. Because they hold the job fixed, these estimates measure only a portion of the total direct productivity benefits of improvements in academic and technical achievement. Nevertheless, these downward biased estimates are many times larger than the costs of one year of instruction. Consequently, even rather expensive reforms of schooling that increase learning--such as longer school days and longer school years--probably have benefit cost ratios that substantially exceed 1.

1.2.3 Consequences for Economic Growth

Improvements in educational achievement were important contributors to productivity growth during the first three-quarters of the twentieth century (Jorgenson, Gollop and Fraumeni 1987, Denison 1988). Did the contribution of education to productivity growth diminish after 1973? Were problems in the education sector contributors to the productivity growth slowdown and the resulting declines in competitiveness and real wages? The answer is yes.

The 1.25 grade level equivalent decline in the test scores of American secondary school graduates between 1967 and 1980 signalled a significant deterioration in the quality of young entrants into the American work force. This decline was unprecedented, for prior to 1967 student test scores had been rising steadily for more than 50 years. In a paper published in the American Economic Review in 1989, I calculated that improvements in general academic achievement (GAA) holding years of schooling constant contributed an additional .212 percent per year to the growth of the quality of labor from 1948 to 1973. Gains in GAA holding

Figure 9

Mathematics at the end of High School

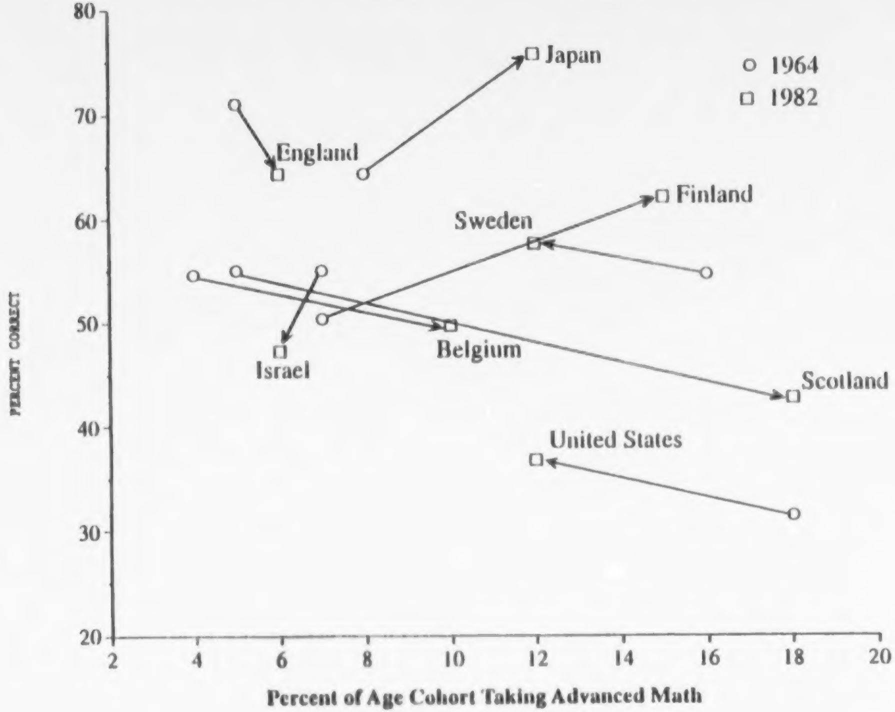
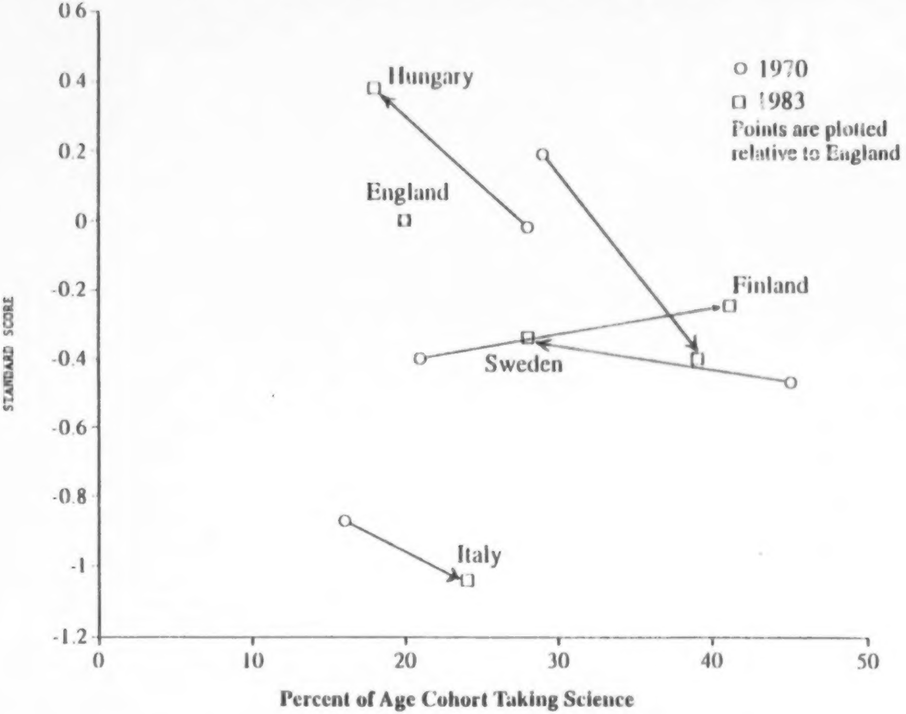


Figure 10

Science at the end of High School



schooling constant, thus, increased labor quality by 5.4 percent over the course of the full 25 year period. Jorgenson, Gollop and Fraumeni (1987) estimate that increases in years of schooling caused labor quality to grow .725 percent per year or a total of 19.9 percent over the course of the 25 years. In combination, the gains in years of schooling and in GAA holding schooling constant increased labor quality 26.3 percent by the end of the period.

After 1973, however, gains in years of schooling and the GAA of those completing specified amounts of schooling began to decelerate. Between 1973 and 1979, the contribution of years of schooling to the growth of labor quality diminished to .612 percent per year. The contribution of schooling-constant GAA gains to the growth of labor quality fell to .157 percent per year between 1973 and 1980 and fell even further to .084 percent per year between 1980 and 1987. If the test scores of high school graduates had continued to grow at the rate that prevailed between 1942 and 1967, labor quality would have been 3.6 percent higher in 1990. The annual social cost in terms of foregone GNP was more than $120 billion in 1990. Even with a forecast of rapid improvements in the quality of elementary and secondary education in the 1990s, the labor quality shortfall grows to 5.5 percent in 2000 and 6.7 percent in 2010.[6]

While the education enterprise has historically been an important source of economic growth, education reform is not a silver bullet that can cure our overall productivity growth problem. A reform of elementary and secondary education that increased the competence of all school leavers by one grade level equivalent (without increasing years spent in school) would be considered a big success. Yet, since the annual flow of young school completers into the labor market is only 3 percent of total employment, such a reform would increase productivity growth by only 0.20 percent per year.[7] It would take 5 years for this reform to increase productivity by just 1 percent. Thus, successful reform of K-12 education is not likely to dramatically improve productivity in the short and medium term. Similarly, the education problems that developed in the late 1960s and 1970s were not the primary cause of the subsequent slowdown of productivity growth. Variations in productivity growth rates over time have many causes, of which education is only one.

This does not imply, however, that the productivity consequences of educational achievement are of little import. **Rather it implies that they take a long time to develop.** Our hypothetical reform raises productivity

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[6] The only way to prevent these forecasts from being realized is to change the relationship between GAA at age 17 and GAA as an adult. This might be accomplished by attracting massive numbers of adults back into school, by expanding educational offerings on television and/or by inducing employers to provide general education to long term employees.

[7] I make the conservative assumption that controlling for preexisting ability differences reduces the impact of a year of secondary school on earnings from the 16 to 20 percent found in raw census data to 10 percent. This 10 percent figure is multiplied by 2/3rds, labor compensations's share of total output, to get the long run effect of the reform on GDP. The annual figure is obtained by multiplying .067 by .03, the ratio of the flow of school leavers to the total labor force. Slow productivity growth is also often blamed on insufficient saving and investment, yet a $120,000,000,000 (2 percent of GDP) increase in the savings rate would increase the growth of Net National Product by only about 0.1 percent per year (Denison 1986). In other words, aggregate productivity levels are not very sensitive to any kinds of policy intervention whether it be investment in physical or human capital.

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growth for roughly 40 years and the 6.7 percent increase in annual output that eventually results is permanent. The nation spends only 4.5 percent of GDP on elementary and secondary education. If a reform of that sector can yield a benefit that on an annual basis is 50 percent greater than total annual spending on K-12 education, the case for that reform would appear to be very strong, even if it takes decades for the reform to have its full effect. If such a reform were implemented now, the present discounted value (using a 5 percent real discount rate) of the projected increase in GDP would be roughly 3.4 trillion dollars.[8] **Education has effects which last a lifetime, indeed generally for many lifetimes** (Haveman and Wolfe 1984).

II. EFFICIENT WAYS OF IMPROVING ACHIEVEMENT

One of the unique characteristics of the American education system is that all the really important decisions--budget allocations, hiring selections, salary levels, teaching strategies, grading standards, course offerings, pupil assignments to courses and programs, disciplinary policies, etc.--are made by classroom teachers and school administrators who are responding to local political pressures. Federal and state officials are far removed from the classroom, and the instruments available to them for inducing improvements in quality and standards are limited. They do not have effective control of the standards and expectations that prevail in the classroom. They do not control the allocation of school funds between academics and athletics.

Aid from higher levels of government can be increased; but econometric studies suggest that increases in state aid reduce local property tax collections by a significant amount (Carroll 1982; Ehrenberg and Chaykowski 1988). For every extra dollar of noncategorical state aid to local school districts only about 50 cents is spent on education by the locality: the rest either lowers tax rates or enables the community to spend more on other public functions. For categorical programs like Title I, the increase in local education spending is larger, but some leakage appears to be inevitable (Tsang and Levin 1983; Monk 1990). The role of the federal government is inevitably very limited. Most of the key decisions are made by students and parents.

Educational researchers and policy makers have proposed a host of changes in educational practice and parent behavior designed to increase academic achievement. A sampling follows:

- Teachers must assign more homework and the assignments must be completed. Yet in some schools "Students were given class time to read The Scarlet Letter, The Red Badge of Courage, Huckleberry Finn, and The Great Gatsby because many would not read the books if they were assigned as homework. Parents had complained that such homework was excessive (Powell, Farrar and Cohen 1985, p.81)."
- Parents must tell children: "Turn off the TV and do your homework." Currently, American students spend 19.6 hrs/wk watching TV while students spend only 6.3 hrs/wk in Austria, 9.0 hrs/wk in Finland, 5.9 hrs/wk in Norway and 10.9 hrs/wk in Canada (OECD 1986).

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[8] We assume that it takes 40 years to replace the entire work force at a rate of .025 per year. The formula for calculating the present discounted value of an educational reform which raises the productivity of all school leavers by 10 percent is $.10(2/3)(\$6.0 \text{ trillion})(.025)(1/r)(1/r)(1-e^{-rt}) = \$3.4$ trillion.

- Students must be engaged in learning--Yet, Frederick, Walberg and Rasher (1979) estimated 46.5 percent of the potential learning time was lost due to absence, lateness, and inattention. After spending hundreds of hours observing in high school classrooms, Theodore Sizer (1984) characterized students as, "*As all too often docile, compliant and without initiative (p. 54).*"
- Students must choose rigorous math and science courses. Yet of those graduating in 1990, only 50 percent had taken chemistry, only 22 percent had taken physics. Only 13.5 percent had taken pre-calculus and only 6.6 percent had taken calculus (NCES 1973 pp. 68, 72). In Canada 25 percent of all 18 year olds are studying science at a level of difficulty that is comparable to AP level courses taken by only about 3 percent of U.S. students (Posthlewaite and Wiley 1992).
- School Boards must be willing to raise local taxes so they can offer better salaries to attract better teachers to their community. Relative to other workers, experienced American upper secondary teachers are currently paid at least 20 percent less than their counterparts in Canada, Finland, France, Germany, Japan, the Netherlands, Norway and the United Kingdom (Nelson and O'Brien 1993, pp. 73-74, 90-91).
- Parents must demand higher standards at their local school. Yet despite the fact that their 5th graders were far behind their Taiwanese and Japanese counterparts in mathematics, 91% of American mothers rate their local school "good" or "excellent." Only 42 percent of Taiwanese and 39 percent of Japanese parents are equally positive (Stevenson, Lee and Stigler 1986).

What almost all of these proposed explanations of educational deficits have in common is that key actors in the learning enterprise (students, parents, teachers, administrators and/or school boards) are being accused of giving insufficient priority to the goal of academic achievement. Some other goal--eg. leisure, avoiding controversy, low taxes, equity--is taking precedence over the academic achievement of students.

Regardless of which of the proposed causes of poor academic performance are the most important, a more fundamental question remains: "Why do American students, parents, teachers, administrators and school boards apparently place a lower priority on the goal of academic achievement than their counterparts in Europe and East Asia." My answer to this question is:

> *The fundamental cause of the low effort level of American students, parents, and voters in school elections is the absence of good signals of effort and learning in high school and a consequent lack of rewards for effort and learning....In most other advanced countries mastery of the curriculum taught in high school is assessed by...examinations which are set and graded at the national or regional level. Grades on these exams signal the student's achievement to colleges and employers and influence the jobs that graduates get and the universities and programs to which they are admitted. How well the graduating seniors do on these exams influences the reputation of the school and in some countries the number of students applying for admission to the school. In the United States, by contrast, students take aptitude tests that are not intended to assess the learning that has occurred in most of the classes taken in high school. The primary signals of academic achievement are grades and rank in class--criteria which assess achievement relative to other students in the school or classroom, not relative to*

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an external standard **(Bishop 1990b).**

2.2–Curriculum Based External Examinations

STUDENT AND PARENT INCENTIVES: External assessments of achievement in specific high school subjects increase the students's rewards for learning and this should induce the student to choose more demanding courses and work harder in them. When such exams are absent, many students choose courses that have the reputation of being fun and not requiring much work to get a good grade. As one student who had avoided the harder courses even though she was sure she could do the work explained her decision: "*Why should I do it,* [the extra work], *if I don't have to?*" (Ward 1994) Teachers know this and adjust their style of teaching and their homework assignments with an eye to maintaining enrollment levels:

> *An angry math teacher [who remembering] the elimination of a carefully planned program in technical mathematics for vocational students simply because not enough signed up for it,...[said] 'Its easy to see who really makes decisions about what schools teach: the kids do.'* (Powell, Farrar and Cohen 1985, p. 9)

External assessments also have pervasive effects on the structure of student rewards. When signals of achievement assess performance relative to fellow students (eg, grades and class rank) rather than relative to an absolute standard, students have a personal interest in persuading each other not to study. The studious are called nerds, in part, because they are making it more difficult for others to get good grades. Since devoting time to studying for an exam is costly, the welfare of the entire class is maximized if no one studies for exams which are graded on a strict curve. The cooperative solution is "no one studies more than the minimum." Participants are generally able to tell who has broken the "minimize studying" code and reward those who conform and punish those who do not. Side payments and punishments are made in a currency of friendship, respect and ridicule that is not limited in supply. For most students the benefits that might result from studying for the exam are less important than the very certain costs of being considered a "brain geek", "grade grubber" or "acting White," so most students abide by the "minimize studying" "don't raise your hand too much" norm. Most American students are part of friendship circles in which the following norms prevail: *It is OK to be smart. You cannot help that. But, it is definitely not OK to spend a lot of time studying. Instead, use your free time to socialize, participate in athletics or earn money.* When learning is assessed relative to an outside standard, students no longer have a personal interest in getting the teacher off track or persuading each other to refrain from studying.

ADMINISTRATOR INCENTIVES: Some American school administrators focus on lowering the failure rate rather than raising achievement. A principal who had recently fired a teacher for failing too many of her students justified his decision with the following:

> *"I have made it very clear that one of my goals is to decrease the failure rate, to make sure the kids feel good about learning, stay in class, stay in school and do well.... Math is just a big body of knowledge; what is Algebra II across the nation anyway?"* he asks. When he taught band, he adds, he certainly didn't expect kids to finish the year as musicians--but he did want them to know more about music than they did before....All the talk about preparing students for college struck him as *"ludicrous."* Instead the goal should be to keep students studying math (Bradley, Sept 19, 1993 p. 19, 20).

When there is no external assessment of academic achievement, students and their parents benefit little from administrative decisions that opt for higher standards, more qualified teachers or a heavier student work load. The immediate consequences of such decisions--higher taxes, more homework, having to repeat courses, lower GPA's, complaining parents, a greater risk of being denied a diploma--are all negative. Since college admission decisions are based on rank in class, GPA and aptitude tests, not externally assessed achievement in high school courses, upgraded standards will not improve the college admission prospects of next year's graduates. Graduates will probably do better in difficult college courses and will be more likely to get a degree, but that benefit is uncertain and far in the future. Maybe over time the school's reputation and, with it, the admission prospects of graduates will improve because the current graduates are more successful in local colleges. That, however, is even more uncertain and postponed. As a result, school reputations are determined largely by things that teachers and administrators have little control over: the socio-economic status of the student body and the proportion of graduates going to college.

The Scholastic Aptitude Test is no substitute for curriculum based exams because it does not assess knowledge and understanding of science, history, social science, statistics and calculus or the ability to write (Jencks and Crouse 1982). Consequently, parents can see that improving the teaching of these subjects will have only minor effects on how their children do on the SAT, so why worry about standards? In any case, doing well on the SAT matters only for those who aspire to attend a selective college. Most American students plan to attend public colleges which admit all high school graduates from the state with the requisite courses.

External exams in high school subjects can be expected to transform the signalling environment. There is now a very visible payoff to hiring better teachers and improving the school's science laboratories. Larger numbers of students pass the external exams and this in turn influences college admissions decisions. School reputations will now tend to reflect student academic performance rather than the family background of the community or the success of football and basketball teams. If additionally parents and students can choose which high school to attend and aid from higher levels of government is based on enrollment, the stakes for the school administrators become very high indeed. Poor student performance on the external exams might force layoffs of school staff.

2.2--Evidence of the Effects of Curriculum Based Exams on Learning

Probably the best way to look for evidence on the impact of curriculum based exams is to compare jurisdictions with different kinds of examinations systems. If possible comparisons should be made with other jurisdictions in the same country. The jurisdictions should be from within one country and must be reasonably large, however, for otherwise colleges and employers are not likely to use grades on the curriculum-based exams in their selection decisions, so the rewards for doing well may be quite limited.

New York vs the Rest of the United States: New York State is reasonably large and has a Regents

Examination system which reaches over half of the state's high school students.[9] It is, indeed, the only state in the U.S. with a curriculum based examination system covering the majority of high school graduates.[10] California is currently trying to introduce one. Consistent with the theory laid out above, the Regents exams (or something else unique to New York State) has raised statewide achievement levels. When the family income, parental education, race and gender of SAT test takers are controlled, New York State has the highest adjusted mean Scholastic Aptitude Test score of the sample of 38 states with adequate numbers of test takers to be included in the study (Graham and Husted, 1993).[11] This occurs despite that fact that Regents exam grades account for less than half of the course grade and influence only the type of diploma received. A passing score on Regents exams is not necessary for admission to non-university higher education and employers ignore exams results when they make hiring decisions.

Comparing Canadian Provinces: Probably the best place to test hypotheses about the impact of curriculum-based external examinations is Canada. Some Canadian provinces have curriculum-based exams--Quebec, Newfoundland, Alberta, New Brunswick and British Columbia; the others do not. The hypotheses outlined in section 2.1 were tested in data on the mathematics and science competence of 42,241 Canadian and American 13 year olds from the International Assessment of Educational Progress (IAEP). Holding the social class background of students constant, students from Canadian provinces with examination systems were substantially (23 percent of a standard deviation) better prepared in mathematics and 18 percent of a standard deviation better prepared in science than students from provinces lacking such exams. The effect of an exam system on mathematics achievement of 13 year olds is larger in a standard deviation metric than the decline in math SAT scores between 1969 and 1980 that has been such a focus of public concern.

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[9] About 56 percent of 9th graders take the Mathematics Course 1 exam and, of these, 24 percent fail. Similar proportions of 10th and 11th graders take the global studies, biology and English exams. Failure rates were 20 percent in global studies, 18 percent in biology and 13 percent in English. The great bulk of those not taking Regents exams are in courses that are considerably less challenging than Regents level courses. The fact that nearly half of New York students are avoiding Regents courses because they perceive them to be too much work or too difficult suggests that the standard of the exam is about as high as is feasible considering current average achievement levels in the state.

[10] The Advanced Placement (AP) examinations are an exception to the generalization that the U.S. lacks a national system of curriculum-based examinations. Students who take these courses and pass the examinations may receive college credit for high school work. While it is growing rapidly, AP is still a very small program. In 1988 only 8,022 of the 22,902 U.S. high schools offered any AP courses. Only 52 AP exams were taken on average in each participating high school (The College Board 1988). Of the 11th and 12th graders in 1993, only 2.8 percent took an AP English exam, 2.3 percent took an AP history exam, 1.7 percent took the AP calculus exam, and 1.7 percent took an AP science exam (NCES 1993). AP students learn more not just because they are a self selected group of highly able students but because the external examination aligns incentives in a way that induces both teachers and students to give higher priority to learning.

[11] Dynarski and Gleason (1993) have also predicted state mean SAT scores while controlling school resource variables and characteristics of the state's population obtained from the Census. Graham and Husted's analysis is preferable for our purposes because it uses data on the background of the students who took the test and no effort was made to control school resource variables that might be influenced by the existence of Regents exams.

The analysis also found that examination systems had pervasive effects on school administrators, teachers and parents. In the provinces with external exams, schools were more likely to:

--employ specialist teachers of mathematics and science
--employ teachers who had studied the subject in college,
--have high quality science laboratories
--schedule extra hours of math and science instruction
--assign more homework in math, in science and in other subjects
--have students do or watch experiments in science class and
--schedule frequent tests in math and science class.

At home students watch less TV, spend more time reading for fun, and are more likely to report their parents want them to do well in math and science. In addition, parents are more likely to talk to their child about what they are learning at school. None of the undesirable effects that opponents of external exams have predicted came about.

Other natural experiments yield similar findings. Sweden eliminated its system of high/medium stakes examinations in the early 1970s. In the decade that followed, the performance of Swedish secondary school seniors on international assessments of achievement in mathematics and science deteriorated relative to other nations (see Figures 9 and 10).

III. A STRATEGY FOR IMPROVING SECONDARY EDUCATION

It is easy to list ways of increasing educational achievement: greater attention in class, more reading, less TV, more homework, more challenging courses, better school climates, better teaching, more competent teachers and longer school years. There are, however, no magic bullets. Young people in other nations learn more than our youth because they work harder at it. What is difficult is identifying practical ways of inducing 47,000,000 students to study harder and 80,000,000 parents to demand higher quality, higher standards education for their children. There are 22,731 public secondary schools in the United Sates that are run by 15,358 largely autonomous local education agencies.

This section of the paper outlines a strategy of change built around increasing the rewards at both the individual and community levels for improvements in academic achievement. The key to motivating students to learn and parents to demand a quality education is recognizing and rewarding learning effort and achievement. Some students are attracted to serious study of a subject by an intrinsic fascination with the subject. They must pay, however, a heavy price in the scorn of their peers and lost free time. Society offers them little reward for their effort. Most students are not motivated to study by a love of the subject. Sixty-two percent of 10th graders agree with the statement, "I don't like to do any more school work than I have to" (Longitudinal Survey of American Youth or LSAY, Q. AA37N). As a result, far too few high school students put serious time and energy into learning and society suffers.

If this situation is to be turned around, the peer pressure against studying needs to be reduced and rewards for learning need to be increased. The full diversity of types and levels of accomplishment need to be signaled so that everyone--no matter how advanced or far behind--faces a reward for greater time and energy devoted to learning. Learning accomplishments need to be described on an absolute scale so that improvements

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in the quality and rigor of the teaching and greater effort by all students in a school makes everybody better off. Colleges need to be induced to select students on the basis of externally validated achievements, not by "aptitude" test scores or rank in class.

If employers know who is well educated in these fields, they will provide the rewards needed to motivate study. Ninety-two percent of 10th graders say they "often think about what type of job I will be doing after I finish school"(LSAY, Q. AA13C). If the labor market were to begin rewarding learning in school, high school students would respond by studying harder and local voters would be willing to pay higher taxes so as to have better local schools. The Secretary of Labor's Commission on Workforce Quality and Labor Market Efficiency advocated such a change in 1989:

> The business community should...show through their hiring and promotion decisions that academic achievements will be rewarded (1989, p. 9).
>
> High-school students who excel in science and mathematics should be rewarded with business internships or grants for further study (1989, p. 11).

Some might react to this strategy for achieving excellence by stating a preference for intrinsic over extrinsic motivation of learning. This, however, is a false dichotomy. Nowhere else are people expected to devote thousands of hours to a difficult task while receiving only intrinsic rewards. Public recognition of achievement and the symbolic and material rewards received by achievers are important generators of intrinsic motivation. They are, in fact, one of the central ways a culture symbolically transmits and promotes its values.[12]

HOW CAN WE BE SURE THIS STRATEGY WILL WORK? WE KNOW IT WORKS BECAUSE IT HAS ALREADY WORKED.

WE HAVE BEEN FOLLOWING THIS STRATEGY FOR MORE THAN A DECADE. The extrinsic rewards for studying in high school rose dramatically during the 1980s. Employers are paying more attention to the academic qualifications of the job applicants and the labor market reward for mathematical ability has risen dramatically (Murnane, Willett and Levy 1994). The payoffs to getting associates degrees and bachelors degrees has nearly doubled. Selective colleges have increasingly based admissions decisions on the rigor of

---

[12] Another possible argument against policies designed to induce employers to reward high school students who study is that poor students will not be considered if an employer learns of this fact. What those who make this argument do not realize is that the policy of providing no information to employers about performance in high school results in no recent graduates (whether good or poor student) getting a job that pays well and offers opportunities for training and promotions. In effect it is being proposed that the interests of the students who do not study and are discipline problems should take precedence over the interests of the students who lived by the schools rules and studied hard. There is nothing unfair about letting high school GPA's influence the allocation of young people to the best jobs. The GPA's are an average which reflects performance on 100's of tests, and the evaluations of over 20 teachers each of which is based on over 180 days of interaction. Selection decisions must be made somehow. If measures of performance in school are not available, the hiring selection will be determined by the chemistry of a job interview and idiosyncratic recommendations of a single previous employer. Since many employers will not request the information, providing information on student performance does not prevent the poorer student from getting a job; it only influences the quality of the job that the student is able to get.

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the courses that students took in high school. The have reduced their reliance on the SAT and discounting high grades obtained in easy courses. States have established minimum competency tests for graduation and increased the number of mathematics and science courses students must pass before graduating.

The increase in rewards for achievement has induced an increase in standards and student study effort. Homework assigned and completed has increased substantially (NCES 1994). High school graduation rates are creeping up. The proportion of high school graduates who have completed algebra II, geometry, pre-calculus, chemistry and other laboratory sciences has risen significantly. The number of students taking AP exams has tripled since 1981.

Higher standards and greater student effort have in turn resulted in higher achievement. NAEP SCORES IN MATHEMATICS AND SCIENCE AT AGE 17 HAVE RISEN BY MORE THAN A GRADE LEVEL EQUIVALENT DURING THE LAST DECADE. Table 3 and Figure 11 present the evidence. Grade level equivalents on the NAEP IRT scale sores can be calculated by dividing the difference between the scores of 17 year old students and 13 year old students by four. Using this simple approach we can see that a GLE is 8.5 points on the NAEP mathematics scale, 9 points on the NAEP science scale and 7.5 points on the NAEP reading scale. **Between 1982 and 1992, mathematics scores of 17 year olds rose 9 points (1.06 GLEs) and science scores rose 11 points (1.22 GLE).** Reading scores have risen 4 points (.53 GLEs) since 1980.

The declines in achievement during the 1970s have been just about erased. This has been accomplished in the face of growing numbers of students from minority and disadvantaged backgrounds. The achievement levels of black and Hispanic students improved by roughly 2 grade level equivalents between 1980-82 and 1992. While the absolute levels of achievement remain disappointing, substantial progress has been made and rising NAEP scores for younger students suggests that the achievement of high school completers will probably continue to improve.

A one grade level equivalent gain in mathematics and science achievement is nothing to be sneered at. **Because of it, each high school completers during the 1990s can expect to earn an additional $1000+ per year more for the rest of their life.** That is the implication of the numbers presented in Table 2. If the gains in math and science were replicated in all other subjects and in the non-cognitive competencies such as dependability and cooperation that normally attend one additional year of schooling, new-entrants into the labor force would now be 10 percent more productive than those who entered at the beginning of the 1980s (the example discussed at the end of section 1.2.3). **The increase in GDP that would result has a present discounted value of 3.4 trillion dollars.**

My conclusion is that education reform is generally headed in the right direction. We appear to be moving ever so cautiously down a path that leads to curriculum based examination systems in many states and school districts. There is no need for a single national system of curriculum based exams. Since curriculum objectives will differ from state to state, states will need to choose the examination/assessment system that fits their goals. States can either develop their own or adopt examinations developed by national organizations such as the College Board, ACT or the National Council of Teachers of Mathematics. The first step is coming to some agreement about what we want students to learn in each subject and how to assess it. This will always be

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Table 3

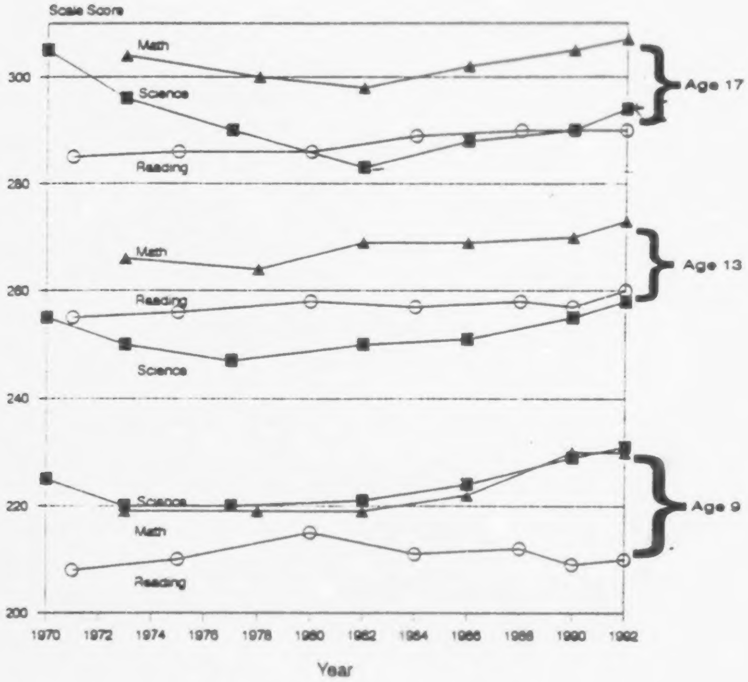
AVERAGE U.S. ACHIEVEMENT TEST SCORES IN SCIENCE, MATHEMATICS, AND READING

Year	NAEP Score: Age 9 - Science	NAEP Score: Age 9 - Mathematics	NAEP Score: Age 9 - Reading	NAEP Score: Age 13 - Science	NAEP Score: Age 13 - Mathematics	NAEP Score: Age 13 - Reading	NAEP Score: Age 17 - Science	NAEP Score: Age 17 - Mathematics	NAEP Score: Age 17 - Reading
1970	225			255			305		
1971			208			255			285
1973	220	219		250	266		296	304	
1975			210			256			286
1977	220			247			290		
1978		219			264			300	
1980			215			258			286
1982	221	219		250	269		283	298	
1984			211			257			289
1986	224	222		251	269		288	302	
1988			212			258			290
1990	229	230	209	255	270	257	290	305	290
1992	231	230	210	258	273	260	294	307	290

SOURCE: Mullis et al. (1994) and the National Assessment of Educational Progress (NAEP)

FIGURE 11

TRENDS IN AVERAGE U.S. ACHIEVEMENT IN SCIENCE, MATHEMATICS, AND READING



SOURCE: Mullis et al. (1994) and the National Assessment of Educational Progress (NAEP).

difficult, but if the choices are made at the state rather than the national level, I think agreements can be forged in most states for most subjects.

If it is to survive in the U.S. political environment, the assessments must hand out good news most of the time. Their voluntary character will tend to assure that because students and districts that anticipate failing will not volunteer to be assessed. As with the AP exams and European exams, multiple levels of achievement will have to be signalled. There must be honor in simply undertaking the challenge and substantial rewards for those who do well. The system will have to start small and grow the way the Bac and the AP exams did. Consequently, it will probably be decades before a medium stakes examination is widespread in the United States.

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Senator **Jeffords**. On that somewhat optimistic note, Dr. Lloyd, please.

Mr. **Lloyd**. Chairman Jeffords and Senator Pell, you have heard distinguished witnesses from business and community and higher education this morning. I am going to concentrate my remarks on K-12 public education, and my argument is that improving K-12 education where 90 percent of the American children attend school is the most valuable investment that this Congress can make in 1995 to increase our Nation's long-term economic competitiveness and well-being.

The single most important cause of change in the lifestyle of Americans today is an earthquake that we call the "information-based knowledge economy." Today 80 percent of our goods and services face international competition. Knowledge has become the critical input, the main cost, the most valuable investment, and the key service in America today. Knowledge has become the world's most critical strategic resource. It is the power that drives productivity in advanced nations.

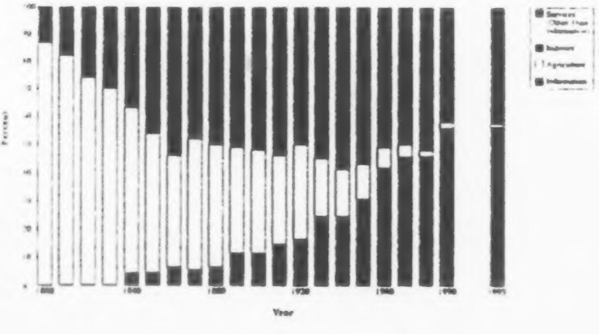
Knowledge provides the livelihood of the largest work force of professional, managerial and technical people ever employed in the United States and other modern nations. In the last 30 years, information knowledge workers grew from 42 percent to almost 60 percent of the work force today.

We have a chart here that will summarize that. The yellow portion is agriculture, starting back in 1800 to moving to today, when we find that it is less than 3 percent, and by 1993, it is about 1.5 percent.

[The chart referred to follows:]

EMPLOYMENT BY MAJOR ECONOMIC SECTOR: 1800 TO 1993

The Rise of the Knowledge Economy



Mr. **Lloyd**. If we look at industry and manufacturing, again we can see how it is shrinking, so that by the year 2000, only 10 percent of the American work force will be in manufacturing.

The service industry bobs up and down, but for the most part, the low wage service industry is also shrinking.

The one industry that is growing like gangbusters is the information knowledge economy, and as I said, by the year 2000, in just 5 years, two out of three of our workers will be in the information knowledge economy.

Vince Lombardi, the popular "American philosopher," has said: "If you don't measure and keep score, you are only practicing." It is past time we started to measure our student performance against world-class standards. if we are to become individually and nationally competitive in today's global knowledge economy.

For the past century, contrary to today's political rhetoric, our K-12 public school system has been largely funded and operated by State and local governments. While States have the primary responsibility under the Constitution to finance and operate public schools, national economic competitiveness and security demand that educational competitiveness also become a top Federal priority before it is too late for our children and grandchildren.

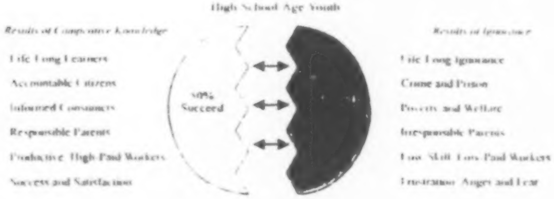
Despite the courageous efforts of dedicated educators, American student performance is rapidly becoming an international embarrassment and a failed democratic promise to at least one-half of America's children. We have had slight improvements over the last few years, but today only one of two American youth between the ages of 17 and 21 is developing the competitive knowledge to succeed in college, hold a productive job, and participate responsibly as a citizen, parent or consumer.

This chart again graphically shows that—50 percent of our students go on to college and hold a good job, becoming lifelong learners, accountable citizens, informed consumers, responsible parents, productive and highly-paid workers, and get success and satisfaction out of their lives. On the other hand, we are paying a terrible price for the results of ignorance in crime and prison, poverty and welfare, irresponsible parents, low-skill, low-paid workers, frustration, anger and fear for those who are not sharing the American dream.

[The chart referred to follows:]

An American Catastrophe: The Growing Gap

Only one of two young adults has developed the values, knowledge and skills to succeed in college, to hold a productive job and to participate responsible in family and community life


High School Age Youth
Results of Competitive Knowledge
Life Long Learners
Accountable Citizens
Informed Consumers
Responsible Parents
Productive, High-Paid Workers
Success and Satisfaction
50% Succeed
Results of Ignorance
Life Long Ignorance
Crime and Prison
Poverty and Welfare
Irresponsible Parents
Low Skill, Low Paid Workers
Frustration, Anger and Fear

Source: Knowledge Network (1993)

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Mr. LLOYD. Our continuing failure to seriously invest in people means we have sacrificed one generation of American citizens and are risking a second.

Can we afford to repair our broken K-12 education system when the Nation is faced with crippling budget deficits and scarce national resources? In 1862 during the Civil War, another hardpressed Congress passed the Morrill Act to create the land-grant colleges which, through education, were to advance agricultural productivity in every State, and today stands as a modern American miracle of educational investment.

Senator Jeffords, may I salute you, because I understand you are a descendant from the family that produced Justin Morrill, and you share that vision for education of your distinguished ancestor.

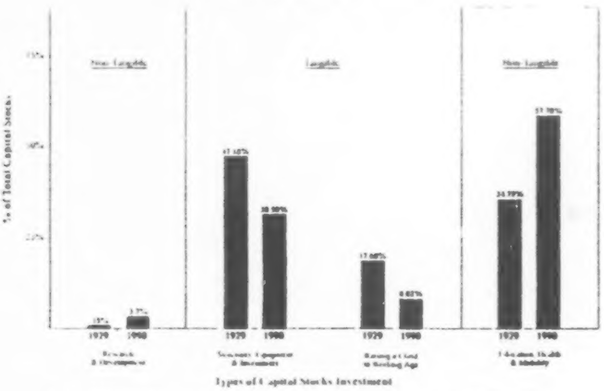
In 1944, another courageous Congress faced the cost of rebuilding the Nation after World War II and enacted the GI bill, with its massive Federal education investments in returning veterans.

Now, in contrast to the fears of some, the U.S. is not losing its industrial competitiveness compared with other advanced nations. Between 1970 and 1987, the United States actually increased its share of manufacturing output by one percent compared to other advanced countries. Nevertheless, evidence shows that other competitor nations are rapidly catching up. In 1990, Japan was achieving 77 percent of U.S. productivity, and Germany 79 percent.

What investment today contributes the most to industrial productivity in America? Our next chart shows that in all sectors of the domestic economy, investments in human capital, people who demonstrate competitive knowledge, account for greater increases in productivity than all other public or private investments combined.

[The chart referred to follows:]

DISTRIBUTION OF AVAILABLE CAPITAL STOCKS:
U.S. DOMESTIC BUSINESS ECONOMY
Resources Available for Investment in Future Productivity
1929 and 1990



Source: Adapted from recent work by John W. Kendrick, Total Capital and Economic Growth (March 1994)

Mr. LLOYD. This is a complex chart, and in my written testimony we have documented this. But today, our economists do not have the tools to measure the impact of human capital or knowledge on the productivity of the economy. In fact, what we have done now for the first time is to go back, and some of our productivity economists—John Kendrick and Baumol—have shown us that between 1929 and 1990, research and development accounted for 3.7 percent of our growth in productivity in those years.

However, intangible contributions, such as structures and equipment and inventories and the cost of raising a child to working age, you can see the decline of the contribution of structures and equipment, or physical capital, in the productivity of the Nation.

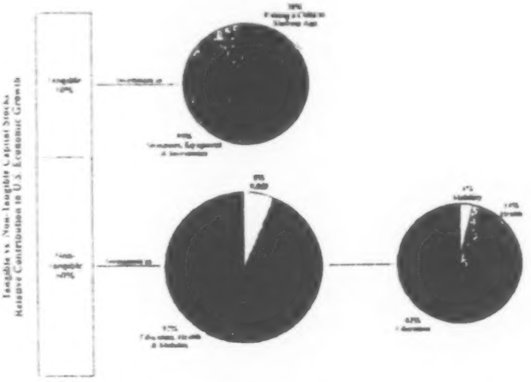
Look at, on the right, however, the contribution of education, health and mobility between 1929 and 1990, when today the nontangible education contribution to GDP is 57.78 percent. The single most important factor in productivity we are now able to document is investment in human capital.

We have heard a lot today about the returns from the value of education for individuals, and again, I want to take just as second to show you the second chart, which indicates that within the nontangible productivity, education contributes 82 percent to that productivity formula. If you had to make a choice about what you are going to invest in, there is the answer.

[The chart referred to follows:]

COMPONENTS FUELING U.S. DOMESTIC ECONOMIC GROWTH

1929 to 1990



Source: Adapted from recent work by John W. Kendrick, Total Capital and Economic Growth (March 1994)

Mr. LLOYD. Now, most Americans do not realize that the drop in the Nation's productivity during the last 20 years has cost each American $28,000 in total loss of earnings had we maintained the rate of productivity between 1948 and 1973. In the "vicious cycle," poor education performance leads to lower worker productivity, less income, reduced tax receipts and cutbacks in educational investment.

In the "virtuous cycle," quality education leads to higher skills, increased productivity, greater income, increasing tax receipts and greater funding to enhance American competitiveness and the well-being of all citizens.

Finally, I want to simply draw your attention, because we have done a little analysis of how the Federal budget has been treating education resource investments just in the last 2 years. We have here a look at the 1993 Bush budget in major categories of Federal expenditures, and the 1995 Clinton budget, to see what has been happening.

[The chart referred to follows:]

SHIFTS IN FEDERAL BUDGET PRIORITIES:

1993 to 1995

Budget Categories	Bush 1993	Clinton 1995	Change: Number	Change: Percent
Total, Transfer Payments	579,969	644,057	64,088	11.1
Total, Interest and Deposit Insurance	264,545	299,809	35,264	13.3
Total, Military and Atomic Energy Defense	254,117	234,669	(19,448)	7.7
Total, Investment in Physical Resources	122,468	126,696	4,228	3.5
Total, Investment in Human Resources	137,894	163,119	25,165	18.3
a) [redacted]	99,418	124,358	29,940	25.1
b) [redacted]	30,004	29,047	(957)	-3.2
c) [redacted]	8,474	9,956	1,482	17.5
Total, General Government Services	17,427	15,225	(2,202)	12.6
Total, Federal Law Enforcement and Judicial Activities	14,956	17,331	2,375	15.9
Total, Foreign Affairs	16,875	17,797	922	5.8
Total, Federal Budget	[illegible]	[illegible]	[illegible]	[illegible]

Source: Generated by [illegible] for the Knowledge Network, based on data from the Office of Management and Budget, Federal Budget for FY 1995.

Mr. LLOYD. As you can see, there have been decreases in most areas—in many areas, I should say—but I will simply conclude by indicating that the only area that we have decreased significantly is the area of increased funding of education in the Federal budget.

I would call that not a very smart strategy for economic competitiveness in the future.

To repeat our theme, competitive knowledge is the knowledge know-how demonstrated by workers through education, training and experience on the job. Competitive knowledge is the key resource Americans need to compete successfully in the global marketplace and to enhance their personal independence and prosperity, improve their standard of living, enrich their families, and build their communities.

The people know this intuitively. When asked if they would like to cut the Federal deficit, 82 percent said yes. When asked if they would like to do it at the expense of education, there was a resounding no. I think the people know what they value.

Again, Mr. Chairman, thank you for letting me take this time.

[The prepared statement of Mr. Lloyd follows:]

IMPROVING NATIONAL ECONOMIC COMPETITIVENESS THROUGH EDUCATIONAL INVESTMENT

By Dr. Kent Lloyd, Chairman
Knowledge Network for All Americans[1]

Testimony before the Subcommittee on Education, Arts and Humanities
United States Senate, February 2, 1995

Mr. Chairman, it a pleasure to testify on the relationship between effective educational investment and economic productivity. We believe this subject is significant to the 104th Congress as it considers how to invest scarce national resources that can best increase American competitiveness in today's **global knowledge economy.**

Introduction

Competitiveness has been defined by the Council on Competitiveness as "the degree to which a nation can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously maintaining or expanding the real incomes of its citizens." I have a question for the distinguished Senators on this Subcommittee: **What is the most valuable federal investment that Congress can make in 1995 to increase our nation's long-term economic competitiveness and well-being?**

You have heard leaders from the corporate world and economists representing higher education. I present a somewhat different national policy perspective on American competitiveness, one that focuses on the results of past investments by federal, state and local governments in K-12 public schools where nine of every ten children's futures are determined. During the past decade, Federal education policy, as well as corporate and private foundation contributions, focused attention on higher education. I commend the progress that makes it possible for historic numbers of young and older people to obtain postsecondary education. Our graduate and professional schools are the envy of the world!

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[1] Former U.S. Secretary of Education Dr. Terrel H. Bell, Dr. Sven Groennings, Dr. Diane Ramsey, Dr. Carol Frances, and Mr. Scot Hymas contributed to preparing this testimony that draws from a *Knowledge Network* study, *KNOWLEDGE REVOLUTION FOR ALL AMERICANS: Creating a New AGENDA to Leverage Existing Federal Education Resources* (1994). We have drawn extensively from the recent work of an internationally-recognized economist on productivity, Professor John Kendrick, who also has read and commented on this testimony.

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The Competitive Challenge: Today's Global Knowledge Economy

In 1983 the National Commission on Excellence in Education warned: "Our nation is at risk. Our once unchallenged preeminence ... is being overtaken by competitors throughout the world ... the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people. What was unimaginable a generation ago has begun to occur -- others are matching and surpassing our educational attainments." This prophetic statement has come true in ways we could not have imagined 12 years ago.

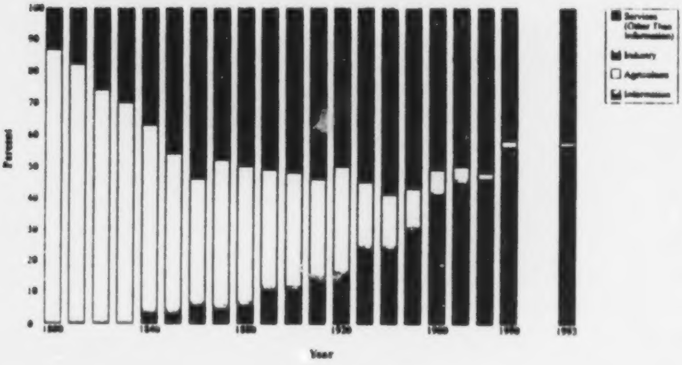
For the past 20 years, foreign competitors have seized traditional U.S. markets -- at home and abroad-- by producing better products at lower prices. Employment opportunities in America's "rust belt" industries began to decline. American productivity suffered. Between 1975 and 1990, our 500 largest industrial companies created no additional jobs; their employees represented only 10 percent of our workforce. By the year 2000, however, the *total number* of semiskilled, blue-collar manufacturing workers will decline to only 10 percent of our American workforce. As both agricultural jobs (3%) and manufacturing jobs dwindled, two new types of jobs emerged: stagnant, labor-intensive personal services and highly-productive, information services. At the same time, the profile of our workforce also changed dramatically: Women were employed in greater numbers than ever before, and both men and women worked longer hours and more days each year to maintain their lifestyles.

The single most important cause of change in the lifestyle of Americans today is an "earthquake" that we call the "information-based global knowledge economy." Today 80 percent of our goods and services face international competition. Knowledge has become the critical input, the main cost, the most valuable investment and the key service in America today. (Knowledge also drives hi-tech agriculture, manufacturing, financial, health and most other service sectors.) Knowledge has become the world's most critical strategic resource. It is the power that drives productivity in advanced competitive nations.

Knowledge services provide the livelihood of the largest workforce of professional, managerial and technical people ever employed in the U.S. and other modern nations. In the last 30 years, information workers grew from 42 to almost 60 percent of the workforce (see graph *Employment by Major-Economic Sector: 1800-1993, The Rise of the Knowledge Economy*). Of the new jobs created in the next five years, over half will be knowledge-based. In the 1990s, the fastest growing occupations will bring higher pay for qualified knowledge workers, but they will require employees with higher math, language and reasoning capabilities than most of our students now achieve. *Today, students and workers*

EMPLOYMENT BY MAJOR ECONOMIC SECTOR: 1800 TO 1993

The Rise of the Knowledge Economy



Source: Adapted from James R. Beniger (1986) and Baumol, Blackman and Wolff (1989) and updated by Knowledge Network

in America are not being educated with the knowledge and skills necessary to be competitive in this new national and world economy. They will become casualties in an undeclared "war against ignorance."

By contrast, our top global competitors are nations with strong public education systems. Their national governments invest scarce public dollars in the race to develop knowledge workers -- tomorrow's vital resource. According to Peter Drucker, the internationally-recognized authority, this knowledge can be acquired only through formal schooling. "Education will become the center of the knowledge society, and the school its key institution ... the performance of the schools and the basic values of the schools will be of increasing concern to society as a whole, rather than being considered professional matters that can safely be left to educators." Knowledge knows no boundaries. It is portable, not tied to any country. It can be created anywhere, anytime and any place. Finally, it is by definition always changing. How well an individual, an organization, an industry or a country does in acquiring and applying knowledge is now becoming the key competitive factor. *Competitive knowledge is information disciplined by responsible personal and civic values, and skillfully applied to improving the quality of life for self, family and others. Individuals who acquire these "knowledge assets" through education are preparing to be life-long students, responsible parents, accountable citizens, informed consumers and productive workers.*

Knowledge as the key resource is fundamentally different from the traditional key resources measured by economists -- land, labor and capital. There is no domestic knowledge and no international knowledge. There is only knowledge. With knowledge as the key resource, there is only a world economy...[1] This means that market forces of the world economy, rather than the national economy, determines our competitiveness. Every country, every industry, and every business will have to consider its competitive standing in the world economy when making its decisions, especially with regard to the development of its knowledge resources.

Elementary/Secondary Public Education (K-12) Student Performance Against International Student Performance Standards

Vince Lombardi, the popular "American philosopher," has said, "If you don't measure and keep score -- you're only practicing." It's past time we started to measure our student performance against world-class standards, if we are to become individually and nationally competitive in today's global knowledge economy.

For the past century, our K-12 public school system, the foundation of our educational system, has been largely funded and operated by state and local governments. While states have the primary responsibility under the Constitution to finance and operate public schools, national economic competitiveness and security demand that educational competitiveness also become a top federal priority before it is too late for our children and grandchildren. Despite the courageous efforts of dedicated educators, American student performance is rapidly becoming an international embarrassment and a failed democratic promise to at least half of America's children. Today our public schools educate 42 million students in 83,500 schools. In the next few years, another 7.1 million children will enroll in schools. *Yet, only one of two American youths between the ages of 17 and 21 is developing the competitive knowledge to succeed in college, hold a productive job, and participate responsibly as a citizen, parent or consumer* (see Diagram, *An American Catastrophe: The Growing Gap*). By our continuing failure to seriously invest in people, we have sacrificed one generation of American citizens and are risking a second.[2]

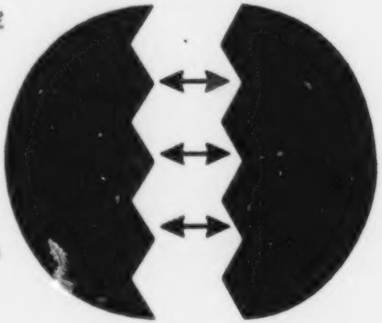
Academic achievement of students in the 1990s is no better than it was in the early 1970s, although in the past two years, performance in reading, science and math is on the rise. More students are taking core academic subjects and participating in advanced placement courses. But the context is different in that the global knowledge economy requires achieving world-class standards for better-paying jobs. The National Assessment (NAEP) reports consistently poor performance by American students, when compared with other students in modern nations, in mathematics, science, geography, history, civics, literature, writing skills and the arts. This not too surprising given that the United States invests a lower percent of its GDP in K-12 education and provides only 180 school days per year compared with England's 192, Germany's 210 and Japan's 243 days.[3]

In 1990, only one out of every five American students in Grade 8, and one out of every eight students in grades 4 and 12 had met performance standards in mathematics. In 1991, 13-year-old Americans were outperformed by students in Korea, Switzerland and Taiwan in all areas tested on an international mathematics assessment, and by students in

An American Catastrophe: The Growing Gap

Only one of two young adults has developed the values, knowledge and skills to succeed in college, to hold a productive job and to participate responsibly in family and community life.

High-School-Age Youth



Results of Competitive Knowledge

- Life-Long Learners
- Accountable Citizens
- Informed Consumers
- Responsible Parents
- Productive, High-Paid Workers
- Success and Satisfaction

Results of Ignorance

- Life-Long Ignorance
- Crime and Prison
- Poverty and Welfare
- Irresponsible Parents
- Low-Skill, Low-Paid Workers
- Frustration, Anger and Fear

Source: Knowledge Network (1994)

France and Hungary in four out of five of the areas. **The lowest quarter of Japanese students outperform the top quarter of American students in mathematics.** Our 13-year-old students were outperformed by those in Hungary, Korea, and Taiwan in three out of four areas tested on an international science assessment. Nearly one-half of all American adults read and write at the two lowest of five levels of English proficiency. This means that they cannot perform the complex literacy tasks required for competing successfully in the global economy and fully exercise the rights and responsibilities of citizenship.[4] A second language, English, is required of all Japanese students. Compared with Japanese and Europeans, Our students perform poorly and require heavier "catch-up" investments to counter past policy failures and inadequate investments in American knowledge capital for all America's children.

We are now just beginning to see a direct relationship between low levels of education and high costs of ignorance to society. If investment in education is such a valuable public priority, what does it cost society -- you and me -- for our failure to invest in education? On the average, all Americans are working longer hours and more days today than they were a decade ago. Consequently, more children are growing up without a father or a mother at home, and parents spend less time creating "responsible family learning cultures." Scarce national resources are being drained to support our uneducated, unskilled, unproductive citizens who are "ignorant" by standards of a global knowledge culture.[5] These expenditures do not contribute to a higher standard of living and are increasing faster than the highly productive investment in education and training. For example, consider the following correlations:

- Almost four million adult Americans cannot read, sign their names, or perform simple addition or subtraction. Thirty million workers can read and write only minimally, and another 40 million lack the basic skills to get by in a technological and rapidly changing world.

- There is a strong relationship between illiteracy and crime. Some 82 percent of juvenile delinquents have inadequate reading skills; 75 percent of prison inmates are functionally illiterate. Because many people have not learned to keep commitments or behave responsibly (behaviors related to low education levels), the costs of risk management have skyrocketed -- security personnel, surveillance technology and legal work. Our nation has one of the highest crime rates in the world, with state spending for corrections and prisons growing rapidly. These expenditures compete with and curtail investment in education.

• Illiteracy and poverty also are closely linked. More than a quarter of American children under six were living in poverty in 1992 -- the highest rate in 25 years. Teenagers with poor academic skills are four times more likely to live in poverty than teenagers with good skills. Illiteracy costs over $200 billion annually in welfare payments, crime, job incompetence, lost tax revenues and remedial education. One-third of all students entering college require some remedial study.

• Employers pay an estimated $30 billion annually on remedial literacy training. Added to this amount is the costs of accidents, shoddy workmanship, additional job training and interviewing excessive numbers of applicants to find the few qualified for entry-level jobs. By the end of the century, nearly 900,000 blue-collar jobs will disappear, requiring more than one-half of those displaced to be retrained.

Some have cited evidence to show that the United States spends more money on education than any other country. That is true when we include the high costs of higher education. Current spending on elementary and secondary education does not match "direct average student spending" of that of our competitor nations. Although 90 percent of all American workers are products of K-12 public schooling, in 1990-91 the U.S. spent 3.5 percent of its GDP on elementary and secondary schools ($4,765 average for each student), Canada spent 4.0 and Sweden 7.0. These figures do not, however, tell the whole story, such as unusually high expenditures ($13,600 average per student) for "special education" students, who are 10.6 percent of all public school students. These high expenditures mask lower funding for regular students.[4]

An adequate investment strategy for reforming our primary and secondary education will require more than just matching the expenditures of other countries. The objective is to achieve comparable performance by students so that we are individually and nationally competitive. Due to years of neglect, a more diverse population and growing numbers of disadvantaged children, a greater investment will be required just to catch up with the performance of students in competitor nations. The United States has promised all students, especially our minority, immigrant and those with disabilities, equal educational opportunity for economic advancement. We will need to invest broadly lest society become even more divided between the "haves" with competitive knowledge and "have-nots" without opportunities to acquire it. The United States will need to spend proportionately more than other countries on primary and secondary education because of the comparatively greater classroom challenge associated with the more heterogeneous nature of American students. The same challenge faces employers retraining their workforce for greater productivity.

Individual students face bleak economic futures because of our shortsighted and self defeating public investment strategies. Can we afford to invest scarce public resources in education at this time? We can't afford not to! History records the courage of two Congresses faced with similar scarce resource challenges. In 1862, when hard pressed to find funds, Congress passed the Morrill Act to create the land-grant colleges, which, through education, were to advance agricultural productivity in every state. At the 25th anniversary of the Act, the Honorable Justin S. Morrill stated:[7]

> Our artisans are to contest with the skill and wealth of many nations, and our farmers are sorely pressed by the competition of agricultural products which cheap and rapid communication pushes to the front in all markets both at home and abroad. To successfully withstand this formidable rivalry, our countrymen need, and it is hoped will here find, that fundamental instruction which is founded on the widest and best experience of mankind.

In 1944 another Congress, facing the expense of reconstructing the nation after World War II, passed the G.I. Bill with its massive education incentives and watched as all-time high rates of productivity showered economic prosperity on all parts of this nation. It would be difficult to imagine a better federal investment!

Human Capital Investment–Knowledge and Economic Growth

Contrary to the fears of some, the U.S. is not losing its industrial competitiveness compared with other advanced nations. Between 1970 and 1987, the United States actually increased its share of manufacturing output by one percent compared to other advanced countries (37 to 38 percent of the output of OECD nations). Over the same period, Japan increased its share from 14 percent to 23 percent, while Germany's share of manufacturing output fell from 14 to 11 percent. Technology-intensive and high-technology industries led the growth both the United States and Japan. "Thus, actual data do not support the belief that the U.S. comparative advantages are shifting away from high-wage industrial products to low-wage sectors."[8]

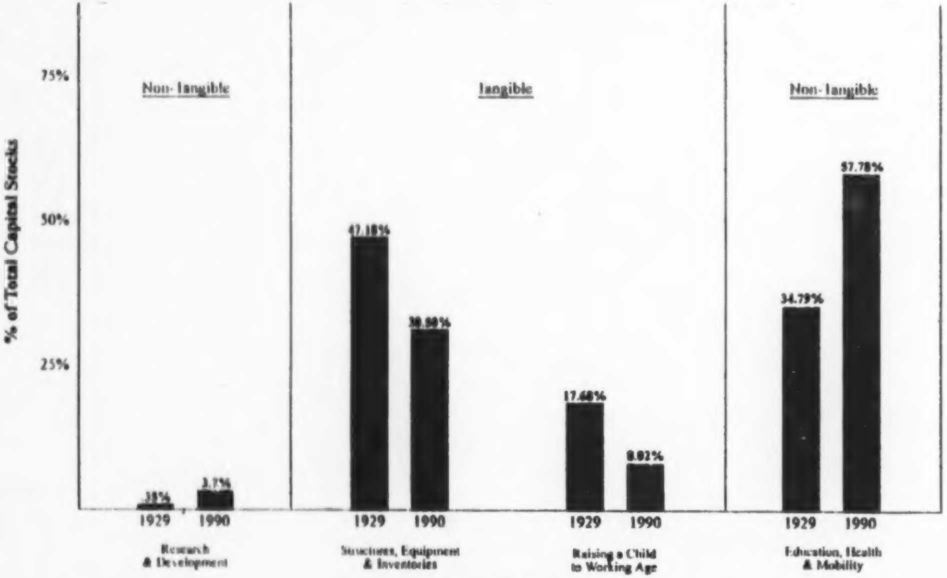
Nevertheless, evidence shows that other competitor nations are rapidly catching up. Productivity in countries with comparable levels of education is converging. In 1990 Japan was achieving 77 percent of U.S. productivity and Germany 79 percent.[9] Between 1990 and 1993, the world-wide recession slowed the productivity growth of all modern nations, highlighting that the productivity gap is widening in countries that have significantly different levels of education.

Figures showing the distribution of available capital stocks (investment that drives growth) in terms of the U.S. domestic business economy demonstrate that "non-tangible" investments in education, training, health and mobility accounted for over one-half of the business sector's productivity growth between 1929 and 1990.[10] Investment by business in physical assets, such as structures, equipment and inventories, actually fell from 47 percent to 31 percent, as a percent of the total, between those same base years. Capital investment in building "competitive knowledge" accounted for the majority of the productivity increase since 1929. Even more startling, the proportion of capital investment devoted to education, health and mobility, 82 percent is in the education and training component (see Figures: *Distribution of Available Capital Stocks: U.S. Domestic Business Economy -- Resources Available for Investment in Future Productivity 1929 and 1990; and Components Fueling U.S. Domestic Economic Growth 1929 to 1990*).[11]

Official estimates of gross private domestic investments are badly flawed, failing to accurately account for the tangible and nontangible human knowledge investments by all sectors of the U.S. economy. Human capital has grown relatively faster in the business sector than investments in physical capital. Today, in all sectors of the domestic economy, investments in human capital -- people who demonstrate *competitive knowledge* -- account for greater increases in productivity than all other public or private investment strategies combined. Following the destruction of their nation after W.W. II, the Japanese recognized that the foundation of economic competitiveness is investment in its human capital -- its citizens -- built a K-12 education system that is designed not only to graduate 92 percent of its children, but high school graduates also meet world-class knowledge standards. American business analysts are just beginning to recognize the profound meaning of their investment in human capital (knowledge) as the keystone for increasing productivity and international competitiveness. According to the chairman of a recent American Institute of certified public accountants institute task force, "The components of cost in a product today are largely R&D, intellectual assets, and services. The old accounting system, which tells us the cost of material and labor is not longer applicable." A spokesman for Ernst & Young's Center for Business Innovation in Boston states that intellectual capital is "intellectual material that has been formalized, captured, and leveraged to produce a higher-valued asset."[12]

DISTRIBUTION OF AVAILABLE CAPITAL STOCKS: U.S. DOMESTIC BUSINESS ECONOMY

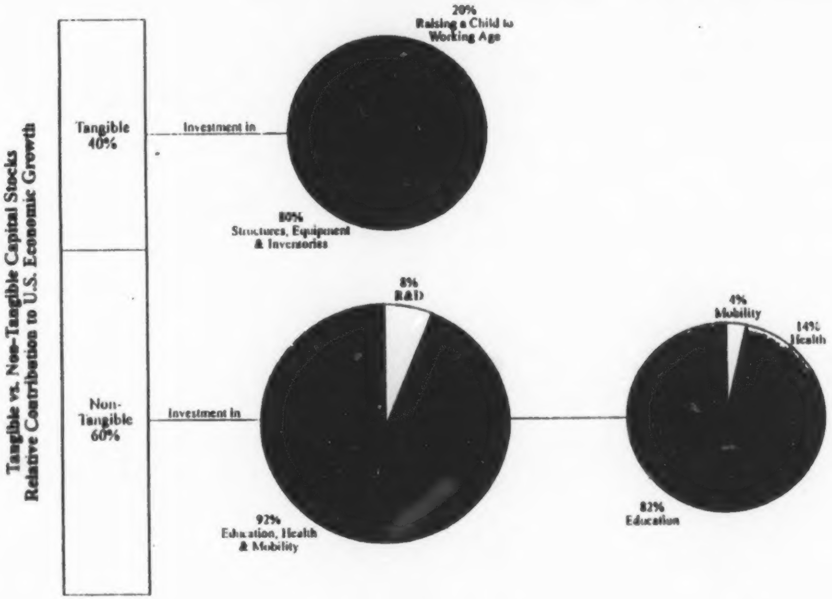
Resources Available for Investment in Future Productivity
1929 and 1990



Source: Adapted from recent work by John W. Kendrick, Total Capital and Economic Growth (March 1994)

COMPONENTS FUELING U.S. DOMESTIC ECONOMIC GROWTH

1929 to 1990



Source: Adapted from recent work by John W. Kendrick, Total Capital and Economic Growth (March 1994)

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Adam Smith had it right in *Wealth of Nations* (1776) when he said, "The skill, dexterity and knowledge of a nation's people is the most powerful engine of its economic growth."[13]

Economic Returns Resulting from Educational Investment

We know that linkages between education and economic productivity are multiple, complex and causal in both directions -- educational investment increases productivity and higher productivity increases investment in education. One approach to estimating the impact of educational investment on productivity is to consider the economic return to individuals who graduate from high school and invest their time and money in postsecondary education.[14] In 1992 the average annual earnings for those with a bachelor's degree were almost twice those of people with only a high school diploma, and more than two-and-a-half times greater than those who had not graduated from high school (see Bar Chart, *AVERAGE ANNUAL EARNING BY LEVEL OF EDUCATION*). For those who completed a graduate professional degree, earned **six times** as much as a high school drop out, and **four** times as much as a high school graduate. In the 1990s, 9 out of 10 new jobs (89 percent) will require some form of postsecondary education.

In my home I have a simple "grandson" test of educational philosophy and policy making. My grandson understands that his choice is simple. He can make $50 for each day's work for the rest of his life, by quitting his education after high school or one year of college, or he can stay in school six years longer and average $500 for each day's work the rest of his life. Because of the high technology demands in today's workplace, the difference in incomes between highly educated people and those with high school educations is actually increasing each year.

A high school diploma today is not sufficient preparation to support a family. In 1973, 60 percent of young men under age 24 were earning enough to support a family of three above the poverty level. By 1990, only 34 percent could do the same. Real entry wages paid in 1991 to male high school graduates were 26.5 percent lower than their counterparts received in 1979, even though the number of low skill jobs has expanded dramatically. Current economic analysis, of course, cannot measure the quality of education, individual motivation, discipline and responsibility that affect individual performance in school and the workplace and gradually develop a competitive workforce. We know that public funding is directly related to the performance of 90 percent of students who attend public schools.

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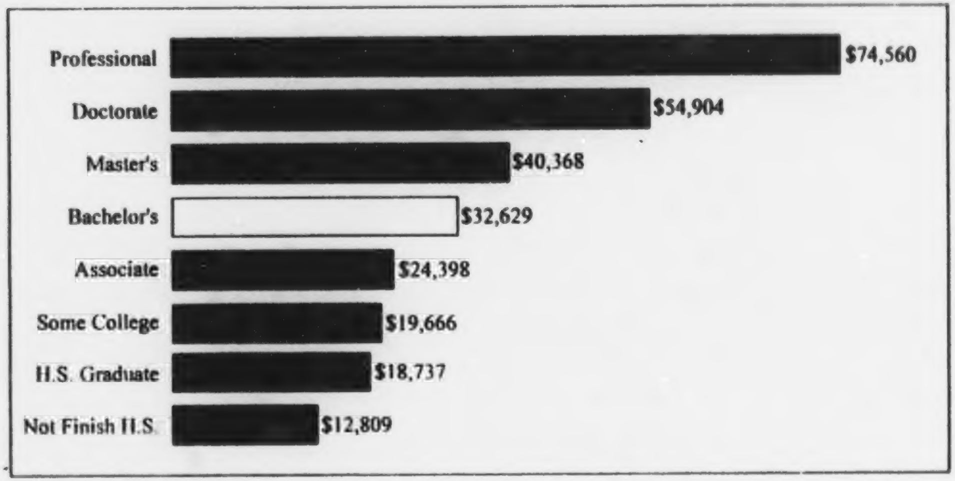
AVERAGE ANNUAL EARNINGS BY LEVEL OF EDUCATION

1992



Source: U.S. Bureau of the Census (1994)

In the "vicious cycle," poor education performance leads to lower worker productivity, less income, reduced tax receipts and cutbacks in educational investment. In the "virtuous cycle," quality education leads to higher skills, increasing productivity, greater income, increasing tax receipts and greater funding to enhance the people's competencies, competitiveness and personal income. Gary S. Becker, Nobel laureate, states, "But in modern economics, growth requires an educated and trained labor force, since production of computers, other electronics, and most manufactured goods and services needs knowledgeable workers. An economy grows faster when rates of return on investments in human capital increase, or when the amount invested expands."[15] The Committee on Economic Development states:[16]

> In a highly integrated global economy, a nation that falls behind in the education and training of its labor force will not remain a leading economic power. If the United States is to remain competitive while achieving satisfactory economic progress for its people, the reality of global integration requires that improvement in our education and training programs be given high priority in both government and private planning.

One reason all Americans should look closely at national economic productivity and competitiveness is that each citizen is a direct stakeholder in the rate of that productivity. Between 1948 and 1973, for example, productivity (GDP) improved about 3.25 percent each year. During the 1970s and 1980s, however, our national productivity slipped to approximately 2.25 percent per year. This decline or lack of competitiveness cost each American $28,000 in total loss of earnings.[17] In 1962, as a new professor of management at the University of Southern California, I purchased my first home for $26,000, less money than I lost between 1973 and 1991 because the United States failed to sustain its productivity growth. Building on their formal education, on-the-job training helps people acquire knowledge and skills that make them productive or competitive in the marketplace. The farther people are removed from the discipline of the marketplace, as in education, government, arts, and other non-profit community organizations, the lower the personal income. There may, of course, be other tradeoffs in personal satisfaction.

Federal Investments in Knowledge Capital

This testimony has attempted to provide new insights on educational investment by demonstrating that knowledge has become the keystone of our national economic competitiveness. Our corporate and household budgets reflect our priorities in allocating scarce resources. It is rumored outside the beltway that the political choices of our elected representatives on the federal budget do not really reflect our nation's public policy priorities. What does the federal budget tell us about changes in the congressionally-appropriated federal resources for the Bush 1993 fiscal year compared with the 1995 fiscal year as it relates to investments in human knowledge capital? (See Table *Shifts in Federal Budget Priorities.*)

Much of the current debate about federal government spending treats all federal outlays in the current fiscal year without regard to return in future years -- only on our present lifestyle. Such discussions usually fail to draw the distinction between current spending and short-term benefits and long-term investment in future productivity and income. By contrast with most federal expenditures, outlays for education and training create new productive capacities -- investments that generate future income and prosperity. For example, in fiscal 1995, federal budget outlays totalling $1.5 trillion include:[18]

● expenditures for transfer payments primarily made as entitlements to older Americans. Transfer payments in fiscal 1995 will reach a total of $644 billion, *more than twenty times the amount invested in education and training*, increasing 11 percent over the fiscal 1993 Bush budget;

● expenditures for interest on the national debt and deposit insurance for fiscal 1995 will total $300 billion dollars -- and climbing every year we run any deficit -- up 13 percent over fiscal 1993. *Interest payments simply steal resources that could be used to invest in the development of our children, youth and adults -- "knowledge capital" -- and actually weaken our national competitiveness;*

● expenditures for military defense and atomic energy for fiscal 1995 of $235 billion are down 7.7 percent over the previous 1993 budget. (A relatively modest amount of this total can be counted as technical training and, therefore, savings for postsecondary education, or making a contribution to industrial R&D which can be counted as competitive investment in "knowledge capital.") With the end of the cold war and the collapse of communism, global competition has shifted from the military front to the global market place, *where a nation's comparative economic advantage is now defined by its investment in the "knowledge capital" of its citizens*;

● expenditures in physical resources (regarded as competitive investment) for fiscal 1995 of $127 billion -- up 3.5 percent -- is more than three times as much as is invested in human resources. Incentives to invest in physical capital, such as cuts in income and capital gains taxes

SHIFTS IN FEDERAL BUDGET PRIORITIES:

1993 to 1995

Budget Categories	Bush 1993	Clinton 1995	Change: Number	Change: Percent
Total, Transfer Payments	579,969	644,057	64,088	11.1
Total, Interest and Deposit Insurance	264,545	299,809	35,264	13.3
Total, Military and Atomic Energy Defense	254,117	234,669	(19,448)	-7.7
Total, Investment in Physical Resources	122,468	126,696	4,228	3.5
Total, Investment in Human Resources	137,894	163,359	25,465	18.5
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total, General Government Services	17,427	15,225	(2,202)	-12.6
Total, Federal Law Enforcement and Judicial Activities	14,956	17,331	2,375	15.9
Total, Foreign Affairs	16,825	17,797	972	5.8
Total, Federal Budget	1,408,201	1,518,943	110,742	7.9

Source: Generated by Carol Frances for the Knowledge Network, based on data from the Office of Management and Budget, Federal Budget for FY 1995.

and increases in deductions for investment in plant and equipment *directly reduce the funds available in the public sector for the much more productive investment in human capital for the knowledge economy;*

- expenditures for general government services amounted to $15 billion in fiscal 1995, a decrease of 12.6 percent from the fiscal 1993 budget;
- expenditures for federal law enforcement and judicial activities cost $17 billion in fiscal 1995, and increase of nearly 16 percent from the fiscal 1993 budget;
- expenditures for foreign affairs totaled $17 billion in 1993, and increase of 5.8 percent over the 1993 budget.
- *expenditures in fiscal 1995 will total close to $1.5 trillion. Of this amount, only about $40 billion (just 2.5 percent) was spent on investment in the nation's human resources -- building "knowledge capital" for education and training of children, youth, and adults. Investments for education actually declined by 3.2 percent from fiscal 1993. Investment in training increased by 17.5 percent, while investment in R&D and General Science and Basic Research also declined slightly.*

To repeat our theme, competitive knowledge is the know-how demonstrated by workers through education, training and experience on the job. It enables them to learn new skills, create new products and services, and design new ways to produce goods and services more efficiently. Competitive knowledge is the key resource Americans need to compete successfully in the global marketplace -- to enhance their personal independence and prosperity, improve their standard of living, enrich their family, and build their community.

The average citizen understands this relationship intuitively. In the *New York Times*/CBS poll, published on December 15, a national sample was asked whether or not they favored a balanced budget amendment. It came as no surprise that 81 percent of respondents favored a balanced budget. When asked if they favored cuts in education spending to balance the budget, only 22 percent of those polled favored balancing the federal budget by cutting spending on education, a drop of 59 percent!

If congressional policymakers fail to recognize education as an essential federal priority and the most strategic public investment, our nation's economic competitiveness will be damaged. Today's global knowledge economy requires the Congress focus its attention on assisting states and grassroots parent-voters to reform public schools. Most importantly we must demand accountability by educators showing that public schools are making significant progress toward helping all America's children to achieve world-class standards by the year 2000.

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2. Kent Lloyd, Diane Ramsey, Sven Groennings, *KNOWLEDGE REVOLUTION for All Americans: Winning the War Against Ignorance – Empowering Public Schools* (1992).

3. Education Commission of the States' Information Clearing House, January 1991.

4. *Building a Nation of Learners, 1994*. The National Education Goals Report.

5. Lloyd, et al., *KNOWLEDGE REVOLUTION FOR ALL AMERICANS: Winning The War Against Ignorance – Empowering Public Schools.*

6. For an analysis showing the U.S. near the bottom of industrial nations in the percentage of GDP spent on public schools see M. Edith Rasell and Lawrence Mishel of the Economic Policy Institute, *Shortchanging Education: How U.S. Spending on Grades K-12 Lags Behind Other Industrial Nations* (1990) and *Measuring Comparative Education Spending: A Response to the Department of Education* (1990). Comparative measures of special education spending are difficult to determine. European nations segregate severely disabled students into institutional care paid for from other budgets. The U.S. Department of Education has undertaken . more accurate of real comparative K-12 cost categories and will report their findings in 1995.

7. Hon. Justin S. Morrill, "ADDRESSES," Delivered at the Massachusetts Agricultural College (Amherst, Mass.: J.E. Williams, Book and Job Printer, 1887, p. 26).

8. Roland Sturm, *How Do Education and Training Affect a Country's Economic Performance? A Literature Survey*. Rand Institute on Education and Training (1994), p. 9.

9. U.S. Bureau of Labor Statistics, "Comparative Real Gross Domestic Product, Real GDP Per Capita, and Real GDP Per Employed Person: Fourteen Countries, 1950-1990,: Memorandum, 1991.

10. This analysis is based on the work of John W. Kendrick, Ph.D., who is an internationally-recognized authority on measuring productivity (see Kendrick, John W., "Total Capital and economic Growth," *Atlantic Economic Journal* (Presidential Address, March 1994, pp. 1-18) (see also Baumol, et al., *Productivity and American Leadership*).

11. This analysis in based on the work of John W. Kendrick, "Total Capital and Economic Growth," *Atlantic Economic Journal* (March 1994, presidential address), pp. 1-18, who is internationally recognized as a leading authority on measuring productivity. Baumol has

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concluded that only about one-fifth of the productivity gain since 1948 came through an increase in education (26 percent) and on-the-job training (55 percent). Baumol, W. J., S.A. Blackman, and E.N. Wolff, *Productivity and American Leadership* (1989).

12. Quotes from Thomas A. Stewart, "Your Company's Most Valuable Asset: Intellectual Capital, *Fortune* October 3, 1994. Edmund Jenkins of Arthur Andersen, and Larry Prusak of Earnest & Young.

13. Selected conclusions by Dr. Kendrick include:

- Official measures of capital investments in all sectors exclude human capital that improves the quality and productivity of tangible capital. Nontangible capital in humans includes education and training, health and safety, and mobility outlays.
- When these human factors are considered, total investment was four times (4.1) the official gross business domestic investment reported in 1990. Traditional measurements badly underestimate the nation's productive capacity;
- Growth of nontangible capital productivity (average compounded annual growth rate of 4 percent) can be attributed to human capital growth;
- By 1990 total tangible and nontangible human capital accounted for 53 percent of the nation's productivity;
- Of those factors that attribute to the increase in human capital, *education accounts for 82 percent*;
- Research and development expenditures are the chief form of nonhuman, nontangible investment. R&D has grown 7 percent annually since 1929. (R&D is a direct result of previous investments in human capital); and,
- Rates of return on investment in nonhuman capital are between 7 and 7.5 percent compared to 14 percent on human capital in 1948, following heavy national investment in the G.I. Bill. By 1990 return on investment in human capital had declined gradually to about 10 percent.

14. The U.S. Bureau of the Census estimated the average annual earnings by level of education using 1992 data (1994).

15. Gary S. Becker, Economic Viewpoint, *Business Week* (February 6, 1995).

16. William J. Beeman and Isaiah Frank, *New Dynamics in the Global Economy* (CEC 1988).

17. Sven Groennings, Kent Lloyd, Jack Carlson and Diane Ramsey, "Education Reform and Investment, New England's Economic Stake," *Connection* (Winter 1992).

18. Data was provided by the Office of Management and Budget and defined by Dr. Carol Frances according to major budget functions and subfunctions. Payments to retired persons under Medicare, for example, are included under transfer payments while outlays for health and safety in the workplace are allocated to investment in human resources. Investments in education focus mainly on K-12 and postsecondary education programs of the U.S. Department of Education and exclude most other welfare and training expenditures outside the Department, such as Headstart, Department of Defense Dependent Schools, and portions of science, arts, humanities, and military education scattered in 150 department and agency programs throughout the federal government.

Senator Jeffords. Thank you all for very excellent testimony. I cannot tell you how helpful statistics are. We are living in the age of 8-second and 30-second news clips and information, and in order to be able to articulate our messages as well as we can, we need the statistical information to verify what we are talking about.

Mr. Kominski, do you see any evidence of hope that there is a change in those trends which you discussed?

Mr. Kominski. Well, not really. I think for a lot of the reasons that you have heard today, the marketplace value of individuals who have a high school degree or less particularly is in serious danger. I do not think there is any reason to expect that those individuals would fare better in the future.

On the other hand, even among persons with some education beyond high school, the marketplace has become tougher over time. The returns are clearly the best for persons with the highest amounts of education. Depending upon which set of research findings you would like to believe, college graduates, bachelor's degree holders, are either doing okay or also sit precariously on the edge. Some of that may have to do with secondary effects such as the field of training that they are involved in and the type of credentials they have actually acquired, the quality of education.

I think certainly, as some of these individuals have pointed out, because of the cost constraints, more and more students turn to public colleges; more and more poor students turn to whatever alternative they can find. Quite often, that includes things like public 2-year schools with lower tuition rates and other noncollegiate kinds of schooling. Either those schools have to be able to provide high-quality education, or else those individuals are really involved in an activity that may not be in their best long-term interest.

Senator Jeffords. Dr. Schapiro, one of the items that is being picked on for budget cuts is the in-school interest subsidy. Do you have any judgment as to what impact it would have if we were to do away with subsidies such as this?

Mr. Schapiro. A lot of educational researchers, myself included, have been looking at these issues for quite some time, and I think some people would be surprised by how much agreement there is with the simple fact that cuts in financial aid or increases in tuition faced by low-income students have an outstandingly large effect on whether or not they are going to enroll.

I talked a little bit about where they are going to enroll, and now disproportionately they are showing up in 2-year community colleges, public community colleges. But whether they go anywhere or not, which as we heard, is now critical than ever, depends critically on the net price of higher education that they face. There is some confusion about what the effects are for middle-income students, but in the absence of the Pell program, for example, the estimates are that we would have one million fewer people in higher education today, and most of those people come from families with income below $30,000.

Given the profound increases in the lifestyle and social and economic status between people who get B.A.s and people who do not, cuts in Federal financial aid, however it is posed, in terms of tuition subsidies or whatever, are going to have a disastrous effect on a very large segment of our population, and that has profound impacts not only personally, but also on economic growth rates for the Nation.

Senator JEFFORDS. We tend to distinguish between college and noncollege post-secondary education, and yet now we are seeing the increasing need for skill training generally, which is really under the category of college. Have you studied the impact of cost increases on students in training or vocational education?

Mr. SCHAPIRO. Educational researchers know less about what was called before the taxpaying schools, or usually called for-profit schools, proprietary schools. We have not had very good data to estimate what the income effects are from attending there, and you heard a lot of talk about some college versus none, or B.A. versus some college. In fact, we know a lot less about the for-profit sector. However, I would agree with what Senator Pell said before that it is very easy to tarnish a whole, very large sector with the same brush. And while we are all very well aware of what has been going on in terms of loan defaults and all sorts of advertising problems, unless we know more about exactly what the educational impacts of attending those kinds of institutions are, we should be a little worried about what we do with them, particularly given the data that I reported on before, that our new study shows that low-income students are increasingly found in that sector, because not only can they not usually, quite often, afford the private sector, but they can no longer generally afford public colleges, 4-year colleges and universities. There has been a profound change in the last 10 years, and it is part of our written testimony—we have some figures there—a profound change in the last 10 years in the distribution of low-income students across educational types. They are increasingly showing up in the for-profit sector and in community colleges.

Senator JEFFORDS. Will there be an effort to study those kinds of situations and demographics?

Mr. SCHAPIRO. Well, I think there have been attempts in the Federal Government to collect better information, particularly on the proprietary sector, and there are some attempts and some studies there, but it is nowhere as advanced. I think we understand a lot about the impact of higher education at the collegiate level, but we know much less about proprietaries. A number of us are interested in that; the limitation so far has been in availability of data sets.

Senator JEFFORDS. Dr. Bishop, you gave very interesting testimony. One thing that intrigues me is that I know that even though we spend many school days less than other nations, we spend substantially more hours in school. And maybe I read the statistics wrong, but it seems to me that we spend a lot more time in school than the days we are in school. Is that accurate, and if so——

Mr. BISHOP. From my work?

Senator JEFFORDS. Yes.

Mr. BISHOP. We spend more time doing math and science in middle school than Europeans do, and the reason that that is the case is because they are studying foreign languages, and we are not. And we do poorly relative to them, even though we spend more time at the study, and that is essentially due to setting lower standards, caused in large part by the lack of a curriculum-based exam at the end of secondary education, which most European countries have those kinds of exams as sort of a standard-setting experience for everybody, the students and the teachers and the principals.

Senator JEFFORDS. Are their school days shorter or about the same as ours?

Mr. BISHOP. I think the students are in school roughly the same amount of time in Europe. They are in school longer in Asia, but in Northern Europe, they are in school about the same amount of time. But they are less involved in physical education and other sort of nonacademic activities.

It would be typical in France, for example, that you would be studying your second foreign language; a large number of students will have learned both English and German as well as, of course, French, and will take a philosophy course senior year.

Senator JEFFORDS. Are there well-defined standards in Europe and Asia as to what they are trying to have as a level of——

Mr. BISHOP. They are much higher. For example, vocational high school in Japan teaches calculus. You study linear algebra if you are in the math/science track in Germany. Linear algebra is the second-year course that you would take in college, typically, in an American university.

The upper secondary school students who do the BOC in France, which now, 70 percent of the age cohort takes the BOC examination, and about 50 percent of the age cohort passes it in France now. Some of those are vocationally-oriented BOCs, but in the academic area, it counts for perhaps 30 percent of the age cohort.

The standard of the BOC in the academic side is equal to the AP standard in the U.S., which only 3 percent or so of students take an AP examination in science, maybe about 3 or 4 percent do in math, and about 5 percent or so do it in history.

So that essentially, they are teaching a standard that we teach 3 percent of our kids to 30 percent of theirs. And it is not just the French. The Canadians teach a standard of science to 28 percent of the age cohort that we teach to just 2 to 3 percent.

So it is quite customary toward the end of secondary school for very high standard science and math to be taught, and to large shares of the age cohort, which we are currently only teaching in the AP classes, which go to a very small segment.

So the standards at the end of secondary school are really dramatically higher in math and science and in foreign language than in the U.S.

Senator JEFFORDS. And they are well-defined; everybody knows them?

Mr. BISHOP. Yes. You can get the curriculum and lay what they are expecting against—they are reasonably comparable to the AP exams, and in fact the curriculum for the AP exams can be laid against it, and would be reasonably comparable.

Cornell gives advanced placement credit to students with the BOC in the subjects that they specialized in, for example, and so we treat it as essentially that they have had an additional year of school.

Senator JEFFORDS. Dr. Lloyd, as Mr. Gorman and Mr. Wurtzel were testifying, one of the things that startled me, and that I had not really thought about, was the multinational aspects of our corporations—that where to locate a plant can well be decided upon whether or not you have the skilled work force available, and if your skilled work force in this Nation seems to be lacking, it is more than likely that plants will be located overseas. Did I understand that correctly, and is that a large factor?

Mr. LLOYD. I think it is a large factor, and if you have to spend 5 to 7 percent of your potential profits on retraining workers—and in American industry, the estimate is $30 billion a year—for failure in the high schools, you are talking to a businessman directly about his profit margins. If he can relocate that plant in Scandinavia or, say, Norway, where they speak fluent English and the workers have high math and science skills, what would possibly prevent an international corporation from making that choice?

Senator JEFFORDS. I think that is an important thing for us to get out to the people in this country: How important it is to improve our educational standards.

Mr. LLOYD. Senator Jeffords, as you have said today and as I think all of the witnesses have underscored, the problem is not standards. Every college and university has standards for the AP examinations, the advanced placement examinations. The 3 percent of high school students that prepare for them in this country understand what the standard is. Our problem is that we need to get the word out and bring the consensus of the culture together, and the leaders and the parents of America, to know that the standards we are expecting out of our young people are simply so low that they have no future, and that our children and grandchildren are sacrificing their future because we adults do not let them know that there are world-class standards.

I think this is a political problem, I think it is a communication problem, and it seems to me that data is not the problem. The problem is communication and making very sure that we understand what the consequences are—early death and poverty if you are not getting a higher education today to be competitive in this world of the knowledge economy.

Senator JEFFORDS. Thank you.

Senator Pell.

Senator PELL. Thank you very much, Mr. Chairman.

Dr. Bishop, in answer to the chairman's question about hours spent in class, I understood you to say the hours are about proximate between Europe and the United States. I do not think that that is correct. I always carry those statistics around in my blue book here, and in the United States, we have 180 days a year in general education; the Swedes have 200; the Soviets, 210; Canada, 200; Thailand, 220; South Korea, 220; Japan, 243; Israel, 260. Those are just a sample taken. But that does not square with your thought that they are about equal.

Senator JEFFORDS. My question was each day.

Mr. BISHOP. The other aspect of it is looking at the amount of time per day, how long the school day is. I am just not familiar with what the numbers are for total, although I could get it for you, when you put the two together. In a paper that I think Senator Jeffords may have seen, I looked at the amount of time that is allocated to math and science instruction in middle schools in the United States relative to European countries, and we do fine in terms of the amount of time that we are spending on science. We learn less in more time, and I attribute that to the lack of real big rewards for studying math and science in this country that exist presently in Europe and in Asia. These subjects are the key to getting into the high-wage majors in college.

A college graduate—this is from Bob Kominski's work—a college graduate in engineering earns twice as much as a college graduate in humanities. The market is saying we need more of these people, that desperately we want more of these people, and we are willing to pay twice as much for them. And yet, despite that, we are not supplying more. In fact, the reason why the wage differential is so high for the math/science majors in college—it is not just the engineers; it is people with physics or chemistry or computer science degrees as well—is that we just do not supply as many of our own kids into those fields. And the fundamental reason is that they cannot handle calculus in freshman year; and the reason they cannot handle calculus in freshman year is because they did poorly—they got a poor math education in high school.

There are many more people entering engineering programs than finish them, and the reason they do not finish them is because they cannot handle the work.

Senator PELL. I guess in essence, we need more engineers and fewer lawyers.

Mr. BISHOP. Yes. So many talented people go into law.

Senator PELL. Another thought, Dr. Bishop, is as to the difference between education and training. To my mind, there is a tremendous difference between the two. Would you agree with that, or do you think they can blend together?

Mr. BISHOP. Well, I consider professional education just about everything that happens once you get to higher—at least into the master's and above, and most of undergraduate education is professional, too. So that while I love economics and do it partly for its love, my graduate training in it was professional education, and it is not really training, it is professional education. And just moving it down into a community college level, when a person really goes deeply into EMT—medical technician—they have to learn science, they have to learn a lot of stuff that fits right into a regular bachelor's degree program of a liberal arts character, but also they need to learn a whole bunch of other things as well. So it blends in that sense.

Senator PELL. Thank you.

Dr. Lloyd, I was fascinated by the graphs that you showed us. Could you describe to me a little bit what you meant in the information portion, the pink portion, and also could you explain what you mean by tangible versus intangible?

Mr. LLOYD. In the first chart, the pink represents the rise in the number of people in the United States who are in the information/knowledge economy. Back in the 1800's, 1840–80, and 1920–60, you can see that curve rising dramatically.

Peter Drucker has described this phenomenon, and we have taken this chart from Beniger and Baumol and extended it to 1990 figures and then to 1993——

Senator PELL. I understand the chart. My question to you is what constitutes the information portion of it; give me a few examples. What kinds of occupations?

Mr. LLOYD. Well, at the very top of the information economy, the knowledge economy, would be research and development, professors who are developing new knowledge, executives who are making decisions based on knowledge. Agriculture today is agribusiness, and again, that has become based on science and knowledge. At the very lowest levels of the information economy, you have people who are processing credit cards, for example, just dealing with the data—the data workers, if you will. Today in banks, you have people who are dealing with computers and so forth in the middle levels. So that is what we mean by that definition.

Senator PELL. And now on the tangible versus intangible chart, what would be some examples of what is tangible and what is intangible?

Mr. LLOYD. Surely. The tangible, as measured by most economists today, relate essentially to investments in physical capital, that is, structures, equipment, inventories, computers, plants, etc.

In the parlance of economics today, they are now talking also about what does it cost to raise a child to 16 years of age that is the parallel to producing an information knowledge worker, and the investment in raising that child and paying for his health, his food, his shelter, etc, is that he is then able to be a producing worker.

The nontangible has to do again with largely, as we can see, education, health, mobility, and research and development. Mobility is your moving around, travel cost; health, of course, is the health benefits that have to be paid; and education and training, we should add, are the biggest component, 82 percent of the nontangible.

Senator PELL. I think I understand. Thank you very much.

Thank you, Mr. Chairman.

Senator JEFFORDS. I thank all of you, and I hope that you will continue to remain a resource for us as we go forth. Unfortunately, we are running into another time bind.

I deeply appreciate your efforts, and we look forward to working with you as we move into the future. Thank you very much for extremely helpful testimony.

With that, the hearing is concluded.

[Whereupon, at 12:20 p.m., the subcommittee was adjourned.]

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